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FARKAS (G. L.), MOLNÁR (G.), & KIRÁLY (Z.). **Control of the Mint rust fungus, Puccinia menthae, by nickel salts.**—*Phytopathology*, **50**, 11, p. 866, 1960.

This information has been noticed [**39**, 728].

LEPPIK (E. E.). **Cercospora traversiana and some other pathogens of Fenugreek new to North America.**—*Plant Dis. Reptr*, **44**, 1, pp. 40–44, 2 fig., 1 map, 1960. [23 ref.]

Among the fungi found in addition to *C. traversiana* [**39**, 484] on *Trigonella foenum-graecum* in Ames, Iowa, from 1957–59 were *Botrytis cinerea* on leaves and pods and *Alternaria tenuis*, *Cladosporium herbarum*, *C. cladosporioides*, *Fusarium* sp., *Rhizopus nigricans* [*R. stolonifer*], and *Stemphylium botryosum* [*Pleospora herbarum*] on seed or germinating seed. A physiologic disorder of unknown etiology characterized by fine brown leaf, stem, and pod spots, when severe resulting in premature death, is provisionally termed 'brown stipple'.

SCHIEBER (E.) & SANCHEZ (A.). **Eye spot of Lemon Grass in Guatemala.**—*Plant Dis. Reptr*, **44**, 9, p. 721, 1 fig., 1960.

The 1st record, from Inst. Agropec. Nac., Guatemala, of *Helminthosporium sacchari* [map 349] on *Cymbopogon citratus* [cf. **20**, 229] in plantations on the Pacific coast of Guatemala.

CALLBECK (L. C.). **Screening of Potato fungicides in 1959.**—*Plant Dis. Reptr*, **44**, 1, pp. 68–70, 1960.

In further trials with 13 products at Charlottetown, Prince Edward Island [cf. **38**, 419], the percentage defoliation caused by *Phytophthora infestans* and percentage tuber rot on Sept. 18 were 18 and 3·2 following LO-1499 (1 qt.+1 lb. $ZnSO_4$/80 gal.) [loc. cit.] and 25 and 3·2 with phaltan (2 lb./80 gal.), respectively, compared with 35 and 6·1 with standard Bordeaux (8–4–80), and 100 and 37·1 in the unsprayed.

NIKIFOROVA (Mme N. A.). Фитофтороз Картофеля в условиях Сахалина. [Potato blight in the conditions of Sakhalin.]—71 pp., 4 fig., 28 graphs, Moscow, Academy of Sciences, U.S.S.R., 1958. Roubles 3. [3 pp. ref. Received Nov. 1960.]

The 2 main sect. of this monograph deal, respectively, with biological and ecological aspects of *Phytophthora infestans* [**35**, 921] (sources of primary infection and the dependence of the length of incubation period on climate and physiological conditions of the infected organs) and the principal protection methods (comparative study of resistant vars., health inspection, chemical control, etc.). The vars. Ural'skiĭ, Krasnoufimskiĭ, and Seyanets 46–69, 6–103, and U8–10 were slightly, and all early vars. highly susceptible [cf. below]. Effective control was obtained from the chemical AB and Cu oxychloride, the yield being increased by 40–69%.

OSIPOVA (Mme E. A.). О селекции Картофеля на фитофтороустойчивость. [On the selection of Potato for *Phytophthora* resistance.]—Сборн. н.-и. Селек. Семеновод. [*Sborn. nauch.-issled. Selek. Semenovod.*], **2**, pp. 123–128, 1958.

Potato losses due to *Phytophthora* [*infestans*: **40**, 181] in the N.W. of the Soviet Union are considerable in bad yrs. Resistant vars. derived from *Solanum demissum*, *S. antipoviczii*, and their hybrids with potato were used as initial material. In field tests hybrids from 2-fold crossing of the wild sp. with *S. demissum* were resistant.

The composite interspecific hybrid (2 *S. demissum* × 8 *S. tuberosum*) was also highly resistant. Of the 334 vars. of the collection studied for 8 yr., Olev was the most resistant. Iŷgeva Kollane, Kameraz, Petrovskiĭ, Capella, Aquila, Fryuny-del', Erica, and Falke were also relatively resistant in the N.W. Among hybrids developed Olev × Priekul'skiĭ rannii, which is resistant to wart [*Synchytrium endobioticum*: **39**, 653] and highly resistant to *P. infestans*, yielded 533 centners/ha. (av. commercial tuber wt. 140–160 g.) in 1957. Also resistant to *P. infestans* and *S. endobioticum* was Olev × Kameraz.

Synchytrium endobioticum (Schilb.) Perc. Potato wart disease in Europe and the Mediterranean Basin in 1959.—10+x pp., Paris, European and Mediterranean Plant Protection Organization, 1960. [Fr. version. Cyclostyled.]

No material changes occurred during the period reviewed by this report [cf. **39**, 121]. Opinions on the relation between wart disease incidence and climatic conditions are not uniform, and available data are inconclusive.

Thiede (H.) & Wierling (F.). **Zur Methodik der Krebsresistenzprüfung im Laboratorium.** [Concerning methods for testing resistance to wart in the laboratory.] —*NachrBl. dtsch. PflSchDienst, Stuttgart*, **12**, 11, pp. 171–172, 1960.

At the Pflanzenschutzamt, Münster, Germany, Spieckermann's method [**3**, 600] was considerably improved by replacing the layer of damp sand used as a base by blotting paper to maintain the moisture of the superimposed compost. With this technique infection by [*Synchytrium endobioticum*] was more than 4 times higher.

Aņikijevs (A.). **Kartupeļu selekcija Carnikavas izmēģinājumu Stacijā.** [Potato selection at the Carnikavas experimental Selection Station.]—*Latv. Zinat. Pēt. Zemkop. Inst. Zinat. Rak. Krājums* 9, pp. 165–177, 1959. [Russ., Engl. summ.]

Selection and study of samples of local potatoes showed that the varietal range of potatoes grown in Latvia includes a large number of different forms, about 30% of which, of unknown origin, are resistant to wart [*Synchytrium endobioticum*: **39**, 653]. Vegetative hybridization of selected vars. undertaken to increase starch content and disease resistance did not give positive results.

Nielsen (L. W.). **Elimination of the internal cork virus by culturing apical meristems of infected Sweet Potatoes.**—*Phytopathology*, **50**, 11, pp. 840–841, 1960.

In further work at N. Carol. State Coll., Raleigh [**39**, 733], 7 apical meristems were dissected from infected Puerto Rico tubers in Na hypochlorite (5·25 g./l.) and grown in a nutrient medium under sterile conditions. Clonal plants derived from 6 of these were free from internal cork virus [**40**, 182], as shown by the absence of internal necrosis from the roots and freedom from chlorotic spotting of the leaves.

Hildebrand (E. M.). **The feathery mottle virus complex of Sweetpotato.**—*Phytopathology*, **50**, 10, pp. 751–757, 1 fig., 1960. [27 ref.]

Studies at U.S. Dept Agric., Beltsville, Md, established that sweet potato feathery mottle [**38**, 767; **39**, 439] is a complex with 3 distinct virus components, yellow dwarf [**40**, 182], internal cork [**39**, 241], and leaf spot, each of which has strs. In the greenhouse and field the yellow dwarf component [**38**, 31], alone or from the complex, was transmitted by *Trialeurodes abutilonea* and the internal cork and leafspot viruses by *Myzus persicae*, *Macrosiphum solanifolii* [*M. euphorbiae*: **39**, 733], and others. All 3 viruses are graft-transmissible. In nature the leaf spot component may occur alone, but so far it has always been found associated with internal cork. Several U.S.A. isolates of yellow dwarf virus produced similar symptoms on

indicator plants and had the same incubation period; none was as injurious as the feathery mottle complex.

GIRARDEAU (J. H.) & RATCLIFFE (T. J.). **The vector-virus relationship of the Sweet-potato whitefly and a mosaic of Sweetpotatoes in south Georgia.**—*Plant Dis. Reptr*, **44**, 1, pp. 48–50, 1960.

The principal vector [**33**, 444; **37**, 737] is *Bemisia tabaci*, which became infective after 1 day on an infected plant. The positive association of this virus with 'feathery mottle' [cf. above] in Ga is still uncertain.

CARLSON (L. W.) & STRUBLE (F. B.). **Methods for determining the reaction of Sweet Potato lines to soil rot.**—*Phytopathology*, **50**, 11, pp. 822–826, 3 fig., 1960.

The pathogenicity of *Streptomyces ipomoeae* [**39**, 190] was tested at Okla agric. Exp. Sta., Stillwater, by dipping fresh roots in a suspension of the pathogen, embedding them in damp vermiculite, and incubating for 5–7 days at 32° C. This technique demonstrated a gradual loss of pathogenicity during repeated transfer on Czapek's agar, but it was not suitable for evaluating susceptibility. Lines with the highest field resistance [**38**, 31] had fewer layers of non-nucleated periderm [**33**, 623] than the susceptible, and generally also a higher rate of root development.

DEAN (J. L.). **A spray method for inoculating Sugarcane seedlings with the mosaic virus.**—*Plant Dis. Reptr*, **44**, 11, pp. 874–876, 1 fig., 1960.

At Miss. agric. Exp. Sta., Meridian, inoculum was prepared from sap of Co. 290 sugarcane infected by virus str. B mixed with 3 g. of 240-mesh silica/100 ml. liquid, and atomized on seedlings. This method gave higher infection rates than the standard rubbing technique [**24**, 121] and is very rapid.

MULDER (D.). **Report of the plant pathologist for 1959.**—*Rep. Tea Res. Inst. Ceylon, 1959*, pp. 67–72, 1960.

Much of the information in this report [cf. **39**, 498] has been noticed [**39**, 346, 735, 736]. The addition of a sticker to 3 oz. Cu oxychloride/acre made no appreciable difference against blister blight (*Exobasidium vexans*). Tea plants infected by phloem necrosis virus grew apparently healthy shoots in the laboratory hot room. A very severe new form of the disease was observed on one estate, in which affected leaves were abscissed. In further studies on oilspot disease the appearance of symptoms was prevented by reducing leaf transpiration by means of a plastic cover. Cuttings from diseased bushes develop normally. Affected bushes grow on deep soil with a layer of clay about 4 ft. down. Symptoms are most severe on rapidly growing shoots with a high transpiration rate and the spots develop round the stomata on the under surface of the leaves, though they do not appear before leaves are mature. An hypothesis that the disorder is due to a substance taken up from badly aerated wet soil or from old wood and concentrated in the leaves by transpiration, where it causes injury by killing cells with the resultant formation of oilspots, is being tested.

DE WEILLE (G. A.). **Blister blight (Exobasidium vexans) in Tea and its relationship with environmental conditions.**—*Netherlands J. agric. Sci.*, **8**, 3, pp. 183–210, 1960. [Germ. summ. 37 ref.]

A review is given from the Royal Netherlands meteorological Inst., de Bilt, of the importance of blister blight in Indonesia, where the smallholders have been hardest hit. From detailed investigation it is concluded that low R.H., high temp., and ultraviolet light [cf. **36**, 618] are fungicidal factors acting on the basidiospores. Sunlight is the principle factor governing attacks [cf. **39**, 735]; altitude also is important. The author applies fungicidal treatments in accordance with a warning

system which depends on 'sun valuation rates' based on 'weighted sums of partly revalued sunshine duration data', the calculations for which are described in detail. This is claimed to be the easiest of the existing warning systems [loc. cit.], and statistical data indicate that in comparison with other systems it is the most precise for Indonesian conditions. It is adaptable to local conditions within the islands by altering the danger limit indicated by the sun valuation rates.

Holmes (F. O.). **Inheritance in Tobacco of an improved resistance to infection by Tobacco mosaic virus.**—*Virology*, **12**, 1, pp. 59–67, 1 fig., 1960.

At the Rockfeller Inst., N.Y., tobacco lines less susceptible to TMV [**35**, 148] than any previously available have been produced by combining the 2 genes by which T.I. 245 tobacco differs from the more susceptible Turkish with N (necrotic type response), G_1 and/or G_2 (non-halo lesions), and r_{m1} and r_{m2} (reduction in lesion size) [**33**, 641]. The new lines produce fewer, smaller, and later-developing necrotic local lesions.

Wolf (F. A.). **Notes on Tobacco diseases in Colombia, South America.**—*Plant Dis. Reptr*, **44**, 1, pp. 62–63, 1960.

The most important pathogens are tobacco mosaic virus, tobacco leaf curl virus (no doubt present there for years and probably prevalent elsewhere in S. America) [map 147], *Phytophthora parasitica* (seldom serious in regions having hot, dry periods), *Cercospora apii* [*C. nicotianae*], and *Alternaria longipes* [map 63], the last 2 on flue-cured tobaccos only.

Ciferri (R.). **La 'muffa blu' del Tabacco.** [Blue mould of Tobacco.]—*G. Agric. Domen.*, **70**, 35–36, p. 331, 1960.

Unconfirmed reports indicate that *Peronospora tabacina* [**40**, 248] has also appeared in Austria and Italy. In Italy the outbreak appears to be confined to the Trentino area and Lombardy.

Pont (W.). **Blue mould (Peronospora tabacina Adam) of Tobacco in North Queensland. Some aspects of chemical control.**—*Qd J. agric. Sci.*, **16**, 4, pp. 299–327, 3 fig., 2 graphs, 1959. [20 ref. Received Nov. 1960.]

Anomalous results were obtained in some of the field spray trials against *P. tabacina* [**40**, 247] at the Div. Pl. Industry, Brisbane, which are described in detail. Zineb, ziram, ferbam, and chloranil were superior to Cu compounds, and their efficiency was increased by cottonseed and white oils with or without malachite green, and cottonseed oil+benzyl or methyl salicylate, though the additives increased phytotoxicity. During an epiphytotic in 1957 the most effective mixture was benzyl salicylate+cottonseed oil+malachite green, applied weekly from 1 week after planting out until just before harvest. The results from spray trials later in the season suggested that infected tobacco plants acquire a resistance to re-infection by *P. tabacina*, but in seedlings this resistance is connected with systemic infection, which may lead to reduced growth and death.

Stokes (G. W.). **Difference in the behaviour of the Nicotiana longiflora wildfire resistance locus in Tobacco varieties Burley 21 and Ky 61.**—*Phytopathology*, **50**, 10, pp. 770–772, 1960.

In comparisons between F_1 and F_2 progenies of resistant×susceptible (Ky 16) tobacco plants at Ky agric. Exp. Sta., Lexington, the *N. longiflora* factor for resistance to *Pseudomonas tabaci* [**40**, 186] in Burley 21 [cf. **38**, 227] was transmitted as a single dominant. With Ky 61 as the resistant parent the progenies contained more susceptible plants than expected. The data indicate that the wildfire resistance locus is on different chromosomes in Burley 21 and Ky 61.

Šutić (D.). **Élimination des réactions non spécifiques au cours du diagnostic sérologique des virus de la Tomate.** [The elimination of non-specific reactions in the serological diagnosis of Tomato viruses.]—*Ann. Épiphyt.*, **11**, 2, pp. 145–152, 1960.

At the Sta. Centrale de Pathologie Végétale, Versailles, it was demonstrated that in the extraction of sap from the middle and upper leaves of tomato plants affected by virus diseases a combined reagent consisting of sodium sulphite (0·5% solution) +disodium phosphate (1·5%) prevented browning and completely inhibited the formation of non-specific reactions, while in the sap extracted from the lower leaves the few non-specific precipitates present were readily distinguishable from specific flocculates. In this solution the virus content was not reduced to a point where it interfered with the serological reaction.

Provvidenti (R.) & Pennisi (C.). **La fusariosi del Pomodoro in Sicilia, e varietà resistenti alla malattia.** [Fusariosis of Tomato in Sicily and varieties resistant to the disease.]—Reprinted from *Tecn. agric.*, **12**, 4, 15 pp., 1960. [16 ref.]

An account is given of tomato wilt (*Fusarium bulbigenum* var. *lycopersici*). The chief resistant vars. grown in U.S.A. are listed, with notes.

Matta (A.) & Vittone (A.). **Impiego dei derivati del piridinetiolo nella lotta contro la verticilliosi del Pomodoro. I. Ricerche sperimentali sul comportamento dell' omadine nel terreno.** [The use of pyridinethiol derivatives in the control of verticilliosis of Tomato. I. Experimental researches on the behaviour of omadine in the soil.]—*Notiz. Malatt. Piante* 52 (N.S. 31), pp. 91–103, 2 graphs, 1960. [Engl. summ.]

At Univ. degli Studi, Turin, Italy, cultures of *Verticillium alboatrum* were used to test for omadine Zn, [cf. **39**, 77], which was absorbed at different rates by different kinds of soil, but released slowly enough to assure good persistence. It does not appear to be inactivated by soil microflora. Downward translocation is affected by variations in the retentive capacity of the soil induced by steam- and dry-sterilization.

Hart (J. H.). **A modified method for culturing Elm samples.**—*Plant Dis. Reptr*, **44**, 10, pp. 806–807, 1960.

At Dept Bot. and Plant Path., Iowa State Univ., Ames, an elm-extract medium was prepared by making the filtrate derived from 120 g. elm sawdust (bark, sapwood, and heartwood of living trees) part boiled and part soaked in distilled water up to 2,400 ml., and adding 40 g. agar over a steam bath. It was not necessary to autoclave the medium or to sterilize the plates into which it was poured. Branches to be cultured, preferably 0·5–1·2 cm. diam. were peeled and cut into cylinders 0·5 cm. long, pressed into the medium, and incubated at 22–25° C. Within 4–6 days abundant coremia of *Ceratocystis ulmi* were produced with few contaminating organisms.

Buchanan (W. D.). **Insects associated with wounds on trees that develop Oak wilt.** —*J. econ. Ent.*, **53**, 4, pp. 578–581, 2 fig., 1 map, 1960.

During 1955–58 the incidence of *Ceratocystis fagacearum* on black and scarlet oaks in 5 plots in S.E. Mo. was significantly higher in trees blazed with an axe or bored with an auger between 11 Apr. and 6 May than in those wounded with a pick or uninjured. Outside these time limits no infection developed irrespective of the type of wounding.

Since insects were caught in traps stapled in auger holes on trees that developed wilt it seems probable that they carried infection [cf. **38**, 489]. However, the source of the latter is unknown, since neither fungus mats nor other recognized foci of infection were detected in systematic surveys made within and around the plots.

YELENOSKY (G.) & FERGUS (C. L.). **Absorption and translocation of solutions by healthy and wilt diseased Red Oaks.**—*Bull. Pa agric. Exp. Sta.* 657, 17 pp., 10 fig., 4 graphs, 1959.

These further studies on [*Ceratocystis fagacearum*: **39**, 54] showed that the upward translocation of water, $CuSO_4$, azosulphamide, and sodium arsenite, following bole injections [cf. **40**, 129] into healthy oaks, was rapid and extensive after bud break (though not more than 1 ft. before this), taking place mostly in the large vessels of the outermost xylem ring. In wilted oaks upward movement was variable and depended upon the number of tyloses occluding the vessels, which was correlated with the percentage of foliar wilt. Recently cut healthy stumps absorbed greater vols. of the test solutions than diseased ones, and the av. absorption in July was twice that in Apr. No downward movement of solutions was detected in healthy oaks. Root grafts did not always prove functional, but in 1 instance dye was translocated through 2 grafted roots totalling 50 ft. in length.

TOOLE (E. R.). **Root rot of White Oak in Arkansas.**—*Plant Dis. Reptr*, **44**, 10, p. 783, 1 fig., 1960.

Roots of dead and dying *Quercus alba* in several localities in the Ozark Mts. yielded cultures of *Corticium galactinum* [cf. **38**, 105]—a new host record.

MALOY (O. C.) & MATTHEWS (F. R.). **Southern cone rust: distribution and control.**—*Plant Dis. Reptr*, **44**, 1, pp. 36–39, 1 map, 1960.

A survey of the area where slash pine (*Pinus elliottii*) is grown commercially showed that infection by *Cronartium strobilinum* is heaviest in central and western N. Fla. Since the principal alternate host is oak (*Quercus virginiana*), seed plantations should be established away from this. Information on control has been noticed [**39**, 58, 748].

ZILLER (W. G.). **Caeoma faulliana, synonym of the tree rust fungus Melampsora albertensis.**—*Canad. J. Bot.*, **38**, 5, pp. 869–870, 1 pl. (7 fig.), 1960.

C. faulliana was originally described as growing on *Abies lasiocarpa* but an examination of type material led to the conclusion that the host was really *Pseudotsuga menziesii*. *C. faulliana* therefore represents the pycnial and aecidial states of *M. albertensis* [**35**, 56].

HAWKSWORTH (F. G.) & HINDS (T. E.). **Cytospora canker of Engelmann Spruce in Colorado.**—*Plant Dis. Reptr*, **44**, 1, p. 72, 1960.

A note describing *Valsa kunzei* cankers [**37**, 321] on *Picea engelmanni* found on this host for the 1st time in 1959 in Pike National Forest, Colo.

BONDARTSEV (A. S.). Пособие для определения домовых грибов. [Manual for the identification of wood-destroying fungi.]—80 pp., 16 col. pl., 22 fig., Moscow-Leningrad, Publishers of the Academy of Sciences of the U.S.S.R., 1956. Roubles 14.80. [3½ pp. ref. Received Oct. 1960.]

This useful work of reference may be used as a text-book, identification guide, and atlas. The general introductory sect. (pp. 5–24) gives a comprehensive account of the biology, ecology, and activity of wood-destroying fungi [cf. **39**, 254]; the sect. on identification (pp. 25–38) consists of a classification of the main spp. according to the colour of mycelium, with 2 identification keys; and the systematic sect. (pp. 39–63) includes 19 spp. treated under Meruliaceae, Polyporaceae, Agaricaceae, and Thelephoraceae. A final chapt. on various types of rot and on control (pp. 68–72) is followed by a series of well-produced full-page illustrations by Mme Z. V. KOBYLETSKAYA.

MARUZZELLA (J. C.), SCRANDIS (D. A.), SCRANDIS (J. B.), & GRABON (G.). **Action of odoriferous organic chemicals and essential oils on wood-destroying fungi.** —*Plant Dis. Reptr*, **44**, 10, pp. 789–792, 1960.

At Long Island Univ., Brooklyn, N.Y., 72% of 115 essential oils [cf. **39**, 273; **40**, 152] and 73% of 78 organic chemicals caused zones of inhibition in cultures of 1 or more test fungi, viz. *Lenzites trabea*, *Polyporus* [*Polystictus*] *versicolor*, and *Lentinus lepideus*. The most active inhibitors, some of which might be of value for wood preserving, were oil of garlic, origanum, thyme red, cassia, styrax, hydratropic aldehyde, *iso*valeric acid, *n*-caproic acid, cinnamic aldehyde, and eugenol.

PETERSON (J. L.) & POUND (G. S.). **Studies on resistance in Radish to Fusarium oxysporum f. conglutinans.**—*Phytopathology*, **50**, 11, pp. 807–816, 9 fig., 1960.

This information on *F. conglutinans* race 2 has been noticed [**39**, 753].

HORNE (R. W.), RUSSELL (G. E.), & TRIM (A. R). **High resolution electron microscopy of Beet yellows virus filaments.**—*J. mol. Biol.*, **1**, pp. 234–236, 4 pl., 1959.

At the Plant Breeding Inst., Maris Lane, Trumpington, Cambridge, negatively stained preparations of the virus from sugar beet [**39**, 754] appeared under the electron microscope as filaments 1-several $\mu \times 10$ mμ, having a regular periodicity and a central hollow core [cf. **38**, 386]. Small hollow particles of the same diam. may be short pieces of filament.

PANFILOV (M.). Аскохитоз Гороха. [Ascochytosis of Pea.]—Земледелие. Животноводство. Молдавии. [*Zemled. Zhivot. Mold.*], **3**, 3, pp. 75–77, 1958.

Observations of pea diseases over a number of years by the sci. Res. Inst. of Irrigation Agric. and Vegetable Growing, Moldavian S.S.R., revealed small-scale incidence of ascochytosis, caused mainly by *Ascochyta pisi* [cf. **37**, 571] and *A.* [*Mycosphaerella*] *pinodes* [map 316]. In 1956 severe infection (75–86%) was only noted in var. Skorospelyĭ mozgovoĭ at Frunze State farm. In 1957 infection was 70–100%. Among the control measures recommended is seed treatment with thiram (8 kg./ton seed) or granosan (1–2 kg./ton).

LLANOS M. (CARMEN) & LOCKWOOD (J. L.). **Factors affecting zoospore production by Aphanomyces euteiches.**—*Phytopathology*, **50**, 11, pp. 826–830, 6 graphs, 1960.

In further work at Mich. State Univ., E. Lansing [cf. **40**, 69], zoospores were obtained in the greatest numbers by culturing in maltose-peptone broth at 20–28° C. for 5 days, then transferring to tap water for 1–2 hr. then to distilled water at 24° [cf. **40**, 196]. Under these conditions isolate 50 from peas produced $2–3 \times 10^5$ zoospores/ml. distilled replacement water, and 2–4 times more if the replacement water was aerated.

SEMANGOEN (H.). **Penjakit-penjakit virus pada Katjang-Pandjang (Vigna sinensis).** [Virus diseases of Cowpea (*V. sinensis*).]—*Kongr. Ilmu Penget. Nas. Pertama, 1958*, pp. 379–407, 4 fig., 1958. [Abs. from Engl. summ. Received Dec. 1960.]

In this contribution from Proc. 1st nat. Sci. Congr., Malang, Indonesia, it is noted that 2 virus diseases occur on cowpeas in Java, mosaic and witches' broom [**36**, 748]. Mosaic was transmitted only by *Aphis medicaginis* and of a number of hosts tried only *Phaseolus lunatus* and *P. radiatus* were infected. Thermal inactivation point was 10 min. at 55–60° C. and the dilution end-point 1:10,000–100,000. It is not certain whether the cowpea mosaic virus in Indonesia is identical with that reported elsewhere.

Witches' broom is neither mechanically nor seed transmitted, but is also transmitted by *A. medicaginis*, though not to a number of leguminous hosts tested. The

chief means of control is by roguing infected plants. The failure of aphid transmission to groundnut and *Crotalaria anagyroides* suggests that the cowpea witches' broom virus is distinct from that on these hosts [loc. cit.].

Kulik (M. M.) & Tims (E. C.). **Differences in pathogenicity and pycnidial production among isolates of Pyrenochaeta terrestris from a single pink root infested field in Louisiana.**—*Plant Dis. Reptr*, **44**, 1, pp. 54–58, 1 fig., 1960.

Much of this information has been noticed [**39**, 141]. Results indicated a correlation between the *in vitro* production of pycnidia by isolates of *P. terrestris* and their ability to cause pink root in onion seedlings.

Chaves (G. M.) & Erickson (H. T.). **Pink root disease of Onions in Minas Gerais, Brazil.**—*Plant Dis. Reptr*, **44**, 11, p. 877, 1960.

This note records the 1st occurrence of *Pyrenochaeta terrestris* on both onion and garlic in Brazil.

Oshima (N.), Henderson (W. J.), & Dickens (L. E.). **The occurrence of Spinach rust in Colorado.**—*Plant Dis. Reptr*, **44**, 11, pp. 828–829, 1 map, 1960.

A survey of saltgrass (*Distichlis stricta*) in Colo. showed a wide distribution of the uredial and telial states of *Puccinia aristidae* [**32**, 115], the spinach rust. It is recommended that before planting spinach neighbouring saltgrass colonies be destroyed.

Kimble (K. A.) & Grogan (R. G.). **Resistance to Phytophthora root rot in Pepper.**—*Plant Dis. Reptr*, **44**, 11, pp. 872–873, 1960.

Further information [**40**, 198] is given from the Dept Plant Path., Univ. Calif., Davis, of 13 (of 613) selections of *Capsicum* lines genetically compatible with *C. annuum* which were more resistant to *P. capsici* than the susceptible California Wonder.

Pound (G. S.) & Singh (G. P.). **The effect of air temperature on multiplication of Tobacco mosaic virus in susceptible and resistant Pepper.**—*Phytopathology*, **50**, 11, pp. 803–807, 3 fig., 1960.

Much of this account has been noticed [**38**, 248]. Resistant plants of *Capsicum frutescens* P.I. 163201 developed only necrotic lesions on inoculated leaves and at no temp. tested did systemic invasion take place.

Ishii (M.) & Aragaki (M.). **Bacterial rind necrosis of Watermelon.**—*Plant Dis. Reptr*, **44**, 10, pp. 761–763, 2 fig., 1960.

A light brown, hard, dry discoloration of watermelon rind was found to be caused by an *Erwinia* sp. near *E. carnegieana* [cf. **38**, 696]. In limited host range tests at Univ. Hawaii, Honolulu, other cucurbit fruits were not susceptible.

Raĭkov (E.), Dzhivilekov (G.), Karadzhov (S.), Neĭkov (S.), Khristodorov (F.), & Tsalbukov (P.). Изпитване на нови безмедни препарати за борба с мана по Лозата. [Trials of new non-copper compounds to control downy mildew of Vine.]—Раст. Защ. [*Rast. Zasht.*], **8**, 4, pp. 27–42, 1960. [Russ., Engl. summ.]

The control of downy mildew (*Plasmopara viticola*) [**39**, 150] at sci. Res. Inst. of Viticulture and Wine-making, Pleven, Bulgaria, by sprays (5–10) with 0·2–0·4% fuclasin ultra, 0·1–0·3% zineb 70, or 0·1–0·35% captan 50 was comparable with that obtained from 1% Bordeaux mixture (up to 100% in either case), but with heavy rainfall the latter fungicide, used in series with the non-Cu compounds, proved more adhesive. Fuclasin, zineb, and captan stimulated the growth of leaves and shoots, and in var. Bolgar the growth of the grapes also. They did not protect

against *Oidium tuckeri* [*Uncinula necator*], for which applications of S dust are recommended.

Report of the Seventh Commonwealth Entomological Conference, 6–15 July, 1960. —399 pp., London, Commonwealth Institute of Entomology, 1960. 50*s*.

At a joint meeting with the 6th Commonwealth Mycological Conference (pp. 157–172) a symposium on 'Developments in the study of plant viruses and their vectors, and their bearing on control measures' comprised the following papers.

M[arion] A. Watson (Rothamsted exp. Sta.) **The ways in which plant viruses are transmitted by vectors** (pp. 157–161). A table is given of 36 plant viruses, arranged in 7 main groups according to persistence, mode of transmission (external passive, internal passive, and with multiplication), and the type of feeding; mode of transmission is distinguished by 3 criteria, (*a*) the latent or incubation period, (*b*) persistence of infectivity of the vectors, and (*c*) passage of virus through the moult. Details of examples in each group and the behaviour of their vectors were described.

A. F. Posnette (E. Malling Res. Sta.) **Some aspects of virus spread among plants by vectors** (pp. 162–165) [34 ref.]. Most viruses with known vectors are transmitted by aphids, which display a wide variety of methods of transmission. Relationships between viruses and their means of survival and transmission in different climatic conditions were outlined and the spread of viruses by mealybugs, mites, and nematodes also briefly discussed.

J. S. Kennedy (Agric. Res. Council, Unit of Insect Physiol., Cambridge) **The behavioural fitness of aphids as field vectors of viruses** (pp. 165–168). Over 180 spp. of aphids have been proved to transmit between them 160 viruses, mostly of the non-persistent type. The apparent relationship between aphid biology and the spread of virus disease was noted as a subject for much speculation. The known facts of the behaviour of winged aphids, the factors influencing this behaviour, and the ecological reasons governing flight duration were reviewed, with reference to behavioural bias in favour of their host plants, the as yet unknown mechanism of vector specificity, and the significance of the common hosts of aphid and virus. Analysis of the recorded behaviour of oligophagous (hosts in not more than 20 families) and polyphagous aphid spp. and the possible explanation of the relative success or failure of transmission by these posed a further question as yet unanswered.

L. Broadbent (Glasshouse Crops Res. Inst., Littlehampton) **Control by insecticides of the spread of plant viruses** (pp. 168–170). The failure of some insecticides to kill the vector before virus transmission has been effected, the greater success of modern chemicals in this respect, the benefits in some instances of spraying adjoining weeds or winter hosts rather than the crop itself, and present trends in the use of systemic insecticides applied to the soil or to tubers were the subjects outlined, with examples.

The 2nd symposium on 'The link between research work and its application in the field of plant protection' was discussed in the light of 5 papers:

A. P. Arnason (Canada Dept Agric., Ottawa) 'The links between research and the grower in the field of plant protection in Canada' (pp. 172–180); F. H. Jacob (Plant Path. Lab., Harpenden) 'The links between research and advisory work in England and Wales' (pp. 180–184); G. Watts-Padwick (Plant Protection Ltd, Fernhurst) 'The link between research and application of crop protection chemicals from the manufacturer's point of view' (pp. 184–187); A. R. Melville (Dept Agric., Kenya) 'Plant protection research and its application under the diverse agricultural conditions of Kenya colony' (pp. 187–190); and F. A. Squire (Fed. agric. Res. Dept, Nigeria) 'Problems of plant protection extension among peasant farmers in West Africa' (pp. 190–195).

SALZMANN (R.). **Tätigkeitsbericht der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon über das Jahr 1959.** [Report on the work of the Federal Agricultural Experiment Station Zürich-Oerlikon for the year 1959.]—*Landw. Jb. Schweiz.* (**74**, ed. fr. **61**), N.S., **9**, 7, pp. 667–744, 2 fig., 1960.

Much of the information in this report [cf. **40**, 6] has been noticed. Notwithstanding conditions favourable to widespread potato virus infection, an unprecedentedly large proportion (75%) of the total certified area was provisionally assigned to class A. Despite this generally low incidence, there was an increase in potato virus Y up to 50% (80–90 in susceptible vars. like Bintje and Sirtema) in the 1958 crop (40% in 1957). Symptoms like those of the ABC disease reported from the Netherlands [**37**, 245] were observed on Eersteling [Duke of York] and Sabina in the experimental field at Maran-Arosa (altitude 1,850 m.). It was demonstrated at Wageningen that the tubers contained tobacco necrosis virus. Corky ring spot caused considerable damage on Bintje, while scab [*Streptomyces scabies*], especially in the so-called 'grassland' form familiar in the Netherlands, was so severe that the tubers were largely unsaleable for the table. Heavy losses in Bintje were also caused in storage by *Alternaria solani*, which was favoured by the high temps. at harvesting; the incidence in varietal trials reached 80%.

Italian rye grass [*Lolium multiflorum*] sustained the heaviest damage ever observed from *Helminthosporium siccans*. There were marked differences in resistance between different clones in the breeding-plot. Other *H.* spp. on fodder grasses included *H. triseptatum* on *Agrostis* spp., *H. leersii* on *Bromus* spp., *Pleospora phaeocomes* on *Dactylis glomerata*, *H.* [*Cochliobolus*] *victoriae* on *Phleum pratense*, and *H. vagans* on *Poa* spp.

The highest degree of resistance to *Erysiphe graminis* in summer barley was shown by Vada, Minerva, and Union.

Berättelse över Nordiska Jordbruksforskares Förenings Elfte Kongress. Oslo 1959. [Proceedings of the 11th Congress of the Norwegian Agricultural Workers' Society. Oslo 1959.] —*Nord. Jordbr. Forskn., Suppl.* 1, 314 pp., 3 diag., 30 graphs, 1960.

G. WEISAETH (Inst. for grönsakdyrking, Norskes Landbrukshögskole, Vollebekk). [Experiment in the production of club root resistant F_1 hybrids of Cabbage.] (pp. 235–240) Some hybrids from German × Norwegian vars. gave good field resistance to *Plasmodiophora brassicae* [**31**, 158], but intensive inbreeding reduced their vigour and yield.

O. POHJAKALLIO (Inst. för växtpatologi, Univ. Helsinki). [On plant pathological problems in connexion with the cultivation of Clover in the Scandinavian countries.] (pp. 280–283) A general review of overwintering problems [cf. **36**, 711].

J. E. HERMANSEN (Kgl. Veterinaer- og Landbohöjskole, Copenhagen). [On rust infection of seed in Denmark in 1958.] (pp. 289–291). Infection tests with *Puccinia triticina* [*P. recondita*: cf. **31**, 101] showed that 2 resistant wheat vars. are really composed of different lines: Abed 51, infected with race 14, gave 37% susceptible, 24% moderately resistant, and 39% highly resistant plants (total 300); for Weibulls 5323, infected with race 62, the figures were 38% susceptible and 62% highly resistant plants (total 80).

E. FØRSUND (Statens Plantevern, Vollebekk [Norway]). [Heating as means of killing *Phytophthora infestans* in seed Potatoes.] (pp. 298–301) Infected tubers subjected to hot air treatment (40–45° C.) [cf. **36**, 120] for 1–8 hr. were freed from infection.

Plantesygdomme i Danmark 1957. Årsoversigt samlet ved Statens plantepatologiske Forsøg. [Plant diseases in Denmark 1957. Annual report compiled by the

State Phytopathological Experiment Station.]—*Tidsskr. Planteavl*, **64**, 4, pp. 553–613, 2 graphs, 1960. [Engl. summ.]

This report [cf. **38**. 389] includes contributions by A. Jensen, M. H. Dahl, H. R. Kristensen, and H. A. Jorgensen. Mn deficiency was again exceptionally widespread in winter and summer cereals and beets: copious applications of $MnSO_4$ improved the condition of the crops.

Potato wart (*Synchytrium endobioticum*) was reported from 2 new municipalities.

The abundant infestation of beet clamps (55%) by *Myzus persicae* during the spring was naturally followed by extensive and severe attacks of beet yellows virus, even in W. and N. Jutland, where it is normally infrequent.

Apple mildew (*Podosphaera leucotricha*) occurred earlier than usual and was much more serious; moreover, it was found in inland districts at a distance from its normal coastal habitat. Cortland was the most susceptible var., followed by Gråsten, Jonathan, and Cox's Orange.

Phytophthora infestans caused heavy damage on tomatoes during the late summer.

New records of viroses for Denmark included turnip yellow mosaic on swedes. The disease was, however, in all probability widespread in the country on turnips from 1921 to 1930, when it disappeared simultaneously with the cultivation of the crop for fodder. Among others were a wheat disease possibly related to wheat striate mosaic [cf. **37**. 363]; rye grass mosaic [on *Lolium* sp.: **40**, 311]; mosaic [? streak] of cocksfoot grass [*Dactylis glomerata*: cf. **39**, 320]; lupin stunt, possibly related to sore shin [pea mosaic virus]; and a mosaic of *Campanula isophylla*, transmissible by sap inoculation to tobacco, *Gomphrena globosa*, *Petunia* sp., *Chenopodium amaranticolor*, and *Datura stramonium*, tentatively attributed to cucumber mosaic virus str.

Fungi observed for the 1st time were *Polymyxa graminis* [cf. **34**, 291] on rye; *Cladochytrium caespitis* on *Agrostis tenuis*; the perfect state of *Mycosphaerella citrullina* on cucumber [cf. **38**, 389]; *Gloeotinia temulenta* on *L. perenne* [**38**, 54]; *Hapalosphaeria deformans* [cf. **38**, 532] on raspberry; and *Cercospora ligustri* on privet.

Large quantities of antisera for potato viruses X and S were produced and used to assay 150,000 and 75,000 samples, respectively. Antisera were also produced against tobacco viruses 1 and 11 [tobacco mosaic and necrosis], *Solanum* virus 2 [potato virus Y (str.)], *Cucumis* virus 2 [cucumber green mottle mosaic], and turnip yellow mosaic virus.

Доклады научной конференции по защите растений (Вильнюс, **27–31** Марта **1958** г.). [Proceedings of the Scientific Conference on Plant Protection (Vilnius, March 27-31, 1958).] 434 pp., 33 fig., 7 diag., 28 graphs, 12 maps, Vilnius, Inst. Biol., Acad. Sci. Lithuanian S.S.R., 1959. Roubles 18.

Papers already noticed in abstract [**38**, 292] are here published in full (pp. 129–136, 219–366); some of the information has appeared elsewhere [**38**, 539; **39**, 56] and in addition are the following papers.

Prisyazhnyuk (A. A.). [Diseases of seed and fruit of tree and shrub stands and their control.] (pp. 129–136; 31 ref.) A survey by S. M. Kirov (Byelorussian tech. Inst. Forestry) of the fungal flora includes 185 spp. of imperfect fungi, 53 ascomycetes, 18 basidiomycetes, and 14 phycomycetes.

Rimkus (A.). [On the improvement of the control of needle cast disease.] (pp. 329–333) A note from the Min. Forestry and Forest Industry of the Lithuanian S.S.R. on the incidence of *Lophodermium pinastri* in pine nurseries and stands during the recent years in relation to July–Oct. temp. and rainfall. Spraying with Bordeaux mixture at 3-week intervals during this period is recommended but if July is cold and dry the 1st spray may be postponed until the end of the month and if Sept. is dry sprays may be suspended. Preliminary trials with lime-sulphur gave promising results.

Zherbele (I. Ya). [On the biology and systematics of the fungi of the genus *Ascochyta*.] (pp. 357–366; 15 ref.) Results are discussed and tabulated of inoculation experiments by the Baltic Sta. Plant Prot. with 8 *A.* spp. [cf. **40**, 147] on hosts of 12 families. Transmission to hosts of gen. not that of the main host was successful with some spp. but only a form of subinfection was secured. In non-specific hosts there was an extension of the incubation period and morphological changes in the pycnidiospores. The ascal state (*Mycosphaerella* or *Didymella*) of most spp. did not develop either *in vitro* or *in vivo*. Of 112 *A.* spp. noticed in the Baltic republics 22 were new records.

Annual Report, Cawthron Institute, Nelson, New Zealand, 1959–60.—35 pp., 1960.

In notes appended to this report [cf. **39**, 655] E. T. Chittenden records (pp. 25–26) further studies on apple bitter pit [cf. **40**, 232] in which acetates or borates of Na, K, Ca, and Mg were sprayed on Cox's Orange, phosphate being replaced by an Fe chelate. Ca caused a slight reduction, the others a varying increase. On 4 trees which received ground limestone at 4 tons/acre incidence was greatly increased, but another 4 given gypsum at the same rate were little affected; this suggests that an induced mineral deficiency may be involved. Fruits susceptible to bitter pit [**39**, 594] also collapse more readily than others through internal breakdown during storage.

In work by T. B. C. Christie (pp. 32–33) on the effect of fertilizer applications to hops against the *Phytophthora* disease (*P. cactorum*) [**38**, 655] no relationship was established between death of the plants and the presence of organic matter in the soil or the type of N fertilizer applied.

New records in the region.—*Quart. Rep. F.A.O. Plant Prot. Comm. S.E. Asia & Pacific Region, 1960, July–Sept.*, pp. 1–2, 1960.

During 1960 [cf. **40**, 274], new records for Malaya [cf. **39**, 536] included *Curvularia lunata* on celery, *Fusarium equiseti* on cabbage, *Phytophthora citrophthora* [map 35] on citrus, and *Guignardia citricarpa* [53] on *Eucalyptus deglupta*.

In W. Pakistan *Cercospora carotae* is a new record on carrot.

Bureau of Plant Pathology. Report of new or unusual plant pathogens.—*Bull. Calif. Dep. Agric.*, **49**, 3, pp. 200–203, 1960.

Of the 5 records of plant pathogenic fungi, new for Calif. are *Gymnosporangium juniperi-virginianae* [map 61] on juniper in Sonoma county, previously known from Maine to N. Dak. and Southern Canada to Fla. and Texas, and *Cytosporina* sp. causing gummosis and dieback of apricot (probably the imperfect state of *Eutypa armeniacae* [cf. **39**, 723]).

The Grower Annual, 1961.—168 pp. (pp. 150–168 adverts.), illus., London, Crosby Lockwood & Son, Ltd., 1961. 25*s*.

G. L. Hey & K. Marshall (Murphy Chemical Co., Wheathampstead) present (pp. 113–118) a guide to horticultural chemicals [cf. **39**, 153], which includes useful notes on fungicides. I. Greenfield (F. W. Berk & Co., Ltd.) describes (pp. 118–120) tests in Essex and Suffolk in 1958–60 against apple scab [*Venturia inaequalis*] and mildew [*Podosphaera leucotricha*] with phelam [loc. cit.] and sulpham (a dispersible powder containing 0·6% phelam and 60% S); the latter (5 lb./100 gal.) controlled both diseases simultaneously. B. G. Wilkinson (Ditton Lab., agric. Res. Council) discusses (pp. 124–126) bitter pit of apples, its nature, effect of environmental factors, and control. A. J. Cooper (Glasshouse Crops Res. Inst.) summarizes (pp. 126–127) the results of 5 yr. work on tomato blotchy ripening [cf. **37**, 633] with special reference to the effects of glasshouse climate. C. Bould (Long Ashton Res. Sta.) describes (pp. 128–130) the control of fruit tree chlorosis by the use of Fe chelates. N. Stewart reviews (pp. 130–132) research at E. Malling

on cherry viruses. D. Hunnam & G. L. Hey (pp. 132–134) describe investigations in 1958–9 into the effect of picking date on the incidence of *Gloeosporium* [*Neofabraea*] *perennans* [cf. **39**, 180] on apples.

Westcott (Cynthia). **Plant disease handbook. Second edition.**—xii + 825 pp., 112 fig., Princeton, N.J., D. Van Nostrand Company, Inc., 1960. 101*s*. 6*d*.

In this edition [cf. **29**, 319] there is some slight re-arrangement, the most important change being the inclusion of all diseases caused by *Sphaceloma* spp. under 'spot anthracnose'. A number of new diseases and a wider range of hosts are included and the section on nematodes has been expanded. In all, over 2,000 plant diseases reported in continental U.S.A. on over 1,000 hosts are described. Recent findings on virus diseases are noted, the information on chemicals and treatments has been brought up to date, and the results of the author's 10 yrs.' further research have been incorporated.

Appel (O.), Blunck (H.), Rademacher (B.), & Richter (H.) (Editors). **Sorauer (P.) Handbuch der Pflanzenkrankheiten. Band VI. 3 Lieferung. Pflanzenschutz: Biologische Schädlingsbekämpfung. Die technischen Mittel des Pflanzenschutzes. Zweite Auflage.** [Sorauer's Handbook of plant diseases. Vol. VI. Part 3. Plant protection: Biological pest control. The technical means of plant protection. Second edition.]—xvi + 628 pp., 380 illus., Berlin, Paul Parey, 1961. DM. 190.

The section on biological control (pp. 1–302) in this edition [cf. **32**, 579; **35**, 881] was prepared by J. M. Franz, and that on equipment and materials by H. Koch & H. Goossen.

Khristov (A.). Специална фитопатология. [Special phytopathology.]—634 pp., 584 fig., 2 graphs, Sofia, State Publishers of agric. Literature, 1959. Leva 21.20. [19½ pp. ref.]

This comprehensive reference book is a revised edition of 'Diseases of cultivated plants in Bulgaria', published in 1956. The contents, covering non-infectious, viral, bacterial, and fungal diseases, are arranged according to the hosts, these being grouped under cereals (pp. 13–101), legumes (pp. 101–139), forage plants (pp. 140–173), 'technical' plants (pp. 173–331), garden vegetables (pp. 332–422), and fruit (pp. 422–604). The account of each disease generally includes a note on symptoms, a description of the pathogen, other hosts, conditions of occurrence, control [**37**, 327], and a reference to the bibliography. An index of Latin names is appended (pp. 625–631).

Săvulescu (Alice), Hulea (Ana), & Bucur (Elena) (Editors). **Protecția plantelor în sprijinul zonării producției agricole în R.P.R.** [Plant protection in relation to the zones of agricultural production in the Romanian People's Republic.]—414 pp., 47 maps, Bucharest, Publishers of the Romanian Acad. Sci., 1960. Lei 18.50. [Russ., Fr. summ. 121 ref.]

A compilation by a number of authors, reviewing observations made over the past 25–30 yr. on diseases and pests, their control, particularly in relation to ecological and biological factors, the use of resistant vars., and the extent of the damage caused. The information is collated according to the usual crop and horticultural plants.

Jaccottet (J.). **Pilze.** [Fungi.]—246 pp., 64 col. pl., 47 fig., Bern, Kümmerly & Frey, Geographischer Verlag, 1957. Fr. 15.80. [Received 1960.]

This popular handbook covers the larger fungi giving brief descriptions of the

common spp. and the habitats where they may be found. Latin and German names are indexed. Most of the examples are well illustrated in colour.

CRUICKSHANK (R.) (Editor). **Mackie & McCartney's Handbook of bacteriology. A guide to the laboratory diagnosis and control of infection.**—xi+980 pp., 45 fig., 10th Ed., Edinburgh, E. & S. Livingstone, 1960. 40*s*.

This indispensable volume has been considerably expanded, the number of pages by 230 and the chapt. from 24 to 46. Part II (technical methods) includes excellent chapt. on microscopy, staining methods, sterilization, culture media and their use, immunological and serological methods, and antimicrobial agents. Part I, microbial biology: infection and immunity; and Part III, pathogenic and commensal micro-organisms, will be of less interest to plant pathologists.

SHIMWELL (J. L.) & CARR (J. G.). **Are species of bacteria unclassifiable?**—*Leeuwenhoek J. Microbiol. Serol.*, **26**, 4, pp. 383–396, 9 fig., 1960.

Among the randomly selected species used in this study was *Erwinia carotovora* from which several cultured variants were obtained.

NOGRADY (G.). **An improved method for photographing superficial microbial colonies.**—*Nature, Lond.*, **188**, 4750, pp. 602–603, 1 fig., 1960.

At the Dept Bact., Univ. Montreal, the required contrast was obtained by slightly colouring the agar surface (flooding with indian ink, 1:100 in distilled water, and withdrawing the surplus after 2–3 min.). This left transparent colonies colourless, and the use of crossed 'polaroid' filters or 'polaroid *J*' film (Fischer Scientific) under and over the dish further emphasized the contrast. As the light source, an X-ray illuminator was suitable.

SABET (K. A.). **Studies in the bacterial diseases of Sudan crops. VI. The production of atypical symptoms by Xanthomonas malvacearum (E. F. Sm.) Dowson and other Xanthomonas spp.**—*Ann. appl. Biol.*, **48**, 3, pp. 529–540, 1 pl. (6 fig.), 1960.

The author (Univ. Cairo) describes studies at Univ. Khartoum, Republic of Sudan, in which atypical symptoms of cotton angular leaf spot (*X. malvacearum*) [cf. **38**, 145] were produced by inoculations of seeds, stem apices, and buds. Lesions on the veins [cf. **39**, 413] of the new leaves were elongated and water-soaked and became dark brown. The leaf tissue dependent upon infected veins became yellow, flaccid, and withered. These symptoms were more marked when the inoculations were made into opening buds or germinating seeds than when they were made into closed buds or dormant seeds.

Atypical symptoms were also produced by *X. ricini* on *Ricinus communis* on bud inoculation; these closely resembled the vein lesions described above on cotton. In *Dolichos lablab* inoculated with *X. phaseoli* atypical symptoms were produced only by seed inoculation and were confined to the 1st simple leaves.

The differences in the production of atypical symptoms on the 3 hosts were shown to be correlated with differences in host structure and with the degree of virulence of the pathogen. Incidence of atypical symptoms is attributed to infection of an actively growing tissue or of a telescoped structure which later completes its development.

The atypical symptoms are more likely to appear on resistant than on susceptible types of cotton, because bud infection of the former is usually mild and does not cause the death of many buds. Cultural and cross-inoculation studies showed that only 1 str. of the pathogen is responsible for the typical and atypical symptoms of angular leaf spot on cotton.

W. J. DOWSON comments (pp. 539–540) that the results obtained confirm the work of Thiers & Blank [**30**, 519].

Kelbitsch (Helba). **Cuscuta als Überträger des Crown-gall-erzeugenden Prinzips.** [Cuscuta as transmitter of the crown gall-producing principle.]—*Protoplasma*, **52**, 3, pp. 437–445, 7 fig., 1960. [25 ref.]

At Inst. für Anatomie und Physiologie der Pflanzen, Univ. Graz, Austria, a suspension of *Agrobacterium tumefaciens* was repeatedly applied to healthy dodder (*C. gronovii*) just before the penetration of the haustoria into the host; *Pelargonium zonale*, *Tropaeolum majus*, *Impatiens balsamina*, *I. holstii*, *I. parvifolia*, *I. sultani*, sunflower, and *Chrysanthemum coronarium* proved particularly suitable for such experiments.

Tumours developed at the sites of inoculation on ½ the plants, but there were none on plants parasitized by bacterium-free dodders nor on intact stems treated with a suspension. Inoculation of a dodder already growing on a tumour-free plant also induced tumour formation unless the parasite died first. Penetration of the haustoria into a tumour-bearing host was invariably followed by the development of secondary neoplasms; transference of the dodder subsequently to a healthy plant likewise resulted in the production of a tumour.

The great similarity between the modes of dodder transmission of virus infections on the one hand and the tumour-inducing principle on the other, demonstrated here, is considered to support the hypothesis that crown gall originates with a virus.

De Ong (E. R.). **Chemical and natural control of pests.** viii + 244 pp., 12 fig., New York, Reinhold Publishing Corp. (London, Chapman & Hall Ltd.), 1960. 60*s*.

The emphasis in this book is largely on pests and it also includes weeds. It is designed for the evaluation by manufacturers, research workers, and farmers of the most effective methods of pest control. Part I includes a chapt. on resistant plants; in part II fungus diseases are discussed in the chapts. on field crops, orchards and vineyards, vegetable crops, ornamentals and lawns, and stored products. An appendix lists the trade and chemical names of pesticides in the text, with their functions. Bibliographies are appended to each chapt.

Berim (N. G.), Voevodin (A. V.), Ivanova (Mme I. A.), & Osmolovskiĭ (G. E.). Краткий справочник по применению ядохимикатов в растениеводстве. [A short handbook on the use of chemical controls in plant growing.]—350 pp., Moscow–Leningrad, Sel'khozgiz, 1960. Roubles 4.50.

The chemicals included are those at present widely used in agriculture in the Soviet Union, or which have been tested and will be introduced soon. A general discussion is followed by detailed information on the control of diseases of specific crops and a brief note on chemical control in relation to storage. An appendix (pp. 317–347) presents in tabular form standards and technical requirements for the main treatments.

Official F.D.A. tolerances. —*Nat. agric. chem. Ass. News*, **19**, 2, pp. 3–19, 1960.

This 7th annually revised list of official pesticide tolerances, established by the Food and Drug Administration, U.S.A., is complete to 1 Dec. 1960 [cf. **39**, 662].

Blumer (S.) & Kundert (J.). **Über den Einfluß der Temperatur auf die Wirkung von Fungiziden.** [On the effect of temperature on fungicide action.] —*Landw. Jb. Schweiz*, (**74**, éd. fr. **61**) N.F. **9**, 5, pp. 465–495, 10 graphs, 1960. [Fr., Engl. summ.]

The action of $CuSO_4$, hydroxyquinoline, and glyodin at different temp. on the germination and growth of *Alternaria tenuis*, *Clasterosporium carpophilum*, *Botrytis cinerea*, and *Monilia* [*Sclerotinia*] *fructigena* was studied at the Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau, Wädenswil. Fungicidal action was min.

under conditions opt. for the fungus, LD_{50} values being raised by alteration of temp., nutrient solution, or pH, prolonged cultivation, or mycelial transfer of the fungus rather than conidial. Bimodal graphs for germination were most clearly marked at opt. temps., i.e. when the fungus was least sensitive. Their occurrence seems to depend more on fungus reaction than on type of fungicide. Sensitivity to a given fungicide was different for germination and for mycelial growth, there being no general relationship between LD_{50} values for germination and growth. Under adverse conditions the fungi, especially *B. cinerea* and *S. fructigena*, formed considerable quantities of mucilaginous substances which may act as filters or adsorbants and thus protect the growing hyphae against the fungicide. Sensitivity of a fungus str. may vary considerably in the course of time, and therefore the validity of any biological test is limited by time.

Kalbe (L.) & Vogel (H.). **Untersuchungen über die Wirkungssteigerung von Fungiziden durch oberflächenaktive Substanzen.** [Studies on the enhancement of efficiency of fungicides by surface-active substances.]—*Zbl. Bakt.*, Abt. 2, **113**, 22–25, pp. 766–772, 1960.

Of 60 surfactants tested at VEB Fettchemie, Karl-Marx-Stadt, Germany, 20 (19 cation-active) proved to be fungistatic to *Alternaria tenuis* at 0·002–0·05%. An alkylbenzolsulphonate and mersolsulphamide enhanced the fungistatic efficiency of thiram in laboratory tests in a manner indicative of synergism. Activity against *Septoria apii* was enhanced only by mersolsulphamide. Thiram—mersolsulphamide was curative on infected leaves.

The mechanism of this synergistic process is unknown and might be attributable either to an increase in permeability of the spore wall or loosening of the host tissue. The compound accelerated the natural swelling of *Penicillium* spores before germination.

Bache (C. A.) & Lisk (D. J.). **Fungicide determination. Rapid polarographic determination of pentachloronitrobenzene on forage and comparison with spectrophotometric method.**—*J. agric. Fd Chem.*, **8**, 6, pp. 459–460, 1960.

At the Dept Ent., N.Y. State Coll. Agric., Ithaca, an adaptation of the Webster and Dawson polarographic method (*Analyst*. **77**, pp. 203–205, 1952) was compared with the colorimetric one of Ackermann (*J. agric. Fd Chem.*, **6**, pp. 747–750, 1958) for the determination of quintozene [cf. **39**, 543 and below] on red clover-timothy [*Phleum pratense*] forage which had been treated against crown rot (*Sclerotinia* [*trifoliorum*]).

Although very satisfactory agreement between the 2 methods was obtained, there were large differences among samples from the same field treatment, possibly attributable to errors in calibration of the hand sprayer, lack of agitation of the fungicide during application, and variations in plant composition at harvest.

Steller (W. A.), Klotsas (K.), Kuchar (E. J.), & Norris (M. V.). **Fungicide residues. Colorimetric estimation of dodecylguanidine acetate residues.**—*J. agric. Fd Chem.*, **8**, 6, pp. 460–464, 1960.

The method developed at the American Cyanamid Co., Stamford, Conn., for the determination of residues of cyprex 65-W (65% dodine [**39**, 153], wettable powder) is fully described with tabulated supplementary data [cf. above and below]. The method is applicable to the determination of residues of 0·2–2·6 p.p.m. in a 50-gm. sample, consisting in these experiments of apple leaves and fruits and cherry fruits.

Frear (D. E. H.), Smith (Elizabeth), & Bowery (T. G.). **Fungicide residues. Dodecylguanidine acetate (dodine) residues on Apples.**—*J. agric. Fd Chem.*, **8**, 6, pp. 465–466, 1 graph, 1960.

In joint studies at Pa State Univ., Univ. Park, and N. Carol. St. Coll., Raleigh, the

colorimetric method of Steller *et al.* [see above] was successfully applied to the analysis of 73 samples of apples (10 vars.) for residues of cyprex 65-W. The av. apparent residue on unsprayed fruits was 0·1 p.p.m., while 56 samples sprayed at 0·5–1·75 lb. 100 gal. water contained up to 1·29 p.p.m. at harvest (av. 0·28). Studies on the disappearance of the chemical revealed residues after 33 days of 0·2, 0·4, and 0·6 p.p.m., from treatments of 0·25, 0·5, and 0·75 lb., respectively, of the WP formulation.

Owens (R. G.) & Blaak (G.). **Chemistry of the reactions of dichlone and captan with thiols.**—*Contr. Boyce Thompson Inst.*, **20**, 8, pp. 475–497, 6 graphs, 1960.

Further details are given of the physiological reactions which might explain the fungicidal action [cf. **38**, 390; **39**, 543] of these compounds.

Sijpesteijn (A. K.). **Organic tin compounds as potential agricultural fungicides.**—*Meded. LandbHogesch. Gent*, **24**, 3–4, pp. 850–856, 1959.

Published information on the development and use of triphenyltin acetate (the active ingredient of brestan [**39**, 378]) is recapitulated [**38**, 58]. Since tin compounds are very toxic to Gram + bacteria, plants utilized for their fermentation products must not be treated with them. [This paper has been noticed previously by title only: **39**, 72.]

Gar (K. A.), Evteeva (Mme N. V.), & Andreeva (Mme E. I.). О фунгицидной активности δ-изомера и смесей δ- и γ-изомеров гексахлорциклогексана. [On the fungicidal activity of the δ-isomer and combinations of the δ- and γ-isomers of BHC.]—*C.R. Acad. Sci. U.R.S.S.*, **127**, 6, pp. 1290–1293, 1 fig., 1959.

Tests at the sci. Inst. for Fertilizers and Insectofungicides showed that the γ- and (especially) δ- isomers of BHC [cf. **38**, 407] are fungicidal, the toxicity of the latter being highly specific for micro-organisms. On potato dextrose agar +0·05, 0·01, or 0·002% of the isomers, the γ only retarded the growth of *Diplodia zeae* [*D. maydis*] colonies, but the δ-isomer was completely or very nearly inhibitory, and also to *Fusarium oxysporum*, *Botrytis* sp., and *Penicillium* sp. Often the greatest inhibition was obtained with medium concs., growth of the colonies increasing with higher concs. This is apparently due to the ability of the isomers to form chelate-like complexes with some metallic ions in some of the biological enzyme systems. In field tests at the Dolgoprudnaya agrochemical Sta. of the Institute seed treatment with 12% δ-isomer, and especially with a 24% mixture (1:1) of both was beneficial to the germination of wheat and flax seed and promoted the growth of maize. The treatments sharply reduced fusariosis in wheat [*F.* spp.] and flax [*F. lini*], polysporiosis in flax [*Polyspora lini*: **39**, 108], and entirely freed wheat with 2·2% infection from bunt [*Tilletia caries*: **39**, 689]. Further field experiments in different climatic zones are required, but the importance of the high fungicidal activity of the δ-isomer has been established. So far it has scarcely been used, being separated from BHC in the production of gamma-BHC and rejected.

Mostafa (M. A.) & Gayed (S. K.). **A comparative study on the effect of [agrocide] Cotton dust and 2,4-D on three pathogenic fungi.**—*Mycopathologia*, **13**, 3, pp. 198–214, 17 graphs, 1960. [Germ. summ.]

Comparative tests at Cairo Univ. demonstrated that the mycelial growth of *Botrytis fabae* was more sensitive to dust (a filler mixed with 40% S, 3% gamma-BHC, and 10% DDT) used for protecting cotton plants against insects, than was that of *Fusarium solani* or *Sclerotium bataticola* [*Macrophomina phaseoli*]. Gamma-BHC was the most effective inhibitory component of the dust [cf. above]; S and DDT induced slight inhibition. The inhibitory effect was more marked when

gamma-BHC was mixed with DDT than when it was mixed with S. At 500 p.p.m. 2,4-D inhibited growth of *B. fabae* more effectively than that of *F. solani* or *M. phaseoli*; at 1% it was fungicidal. The germinability of the conidia of *F. solani* and *B. fabae* was suppressed by 2,4-D.

Scardavi (A.). **Efficacia antigerminativa di anticrittogamici organici su conidi di Dematiaceae quali 'testi' per tossicometria.** [The anti-germinative efficacy of organic fungicides against conidia of Dematiaceae as a toxicometric assay.]—*Atti Ist. bot. Univ. Pavia*, Ser. 5, **18**, pp. 282–309, 3 graphs, 1960. [Engl. summ.]

In tests with commercial formulations containing 50% captan, 27% nabam, 50% phaltan, 75% thiram, 65% zineb, 95% ziram, or Caffaro dust against the conidia of *Alternaria citri*, *A. dianthi*, *A. humicola*, *A. solani*, *A. tenuis*, *Helminthosporium oryzae* [*Ophiobolus miyabeanus*], *Humicola grisea*, *Macrosporium* sp., *Sporidesmium bakeri* [*Pithomyces chartarum*], and *Stemphylium sarciniforme* the parasitic spp. of *A.*, particularly *A. solani*, were the most sensitive to organic and Cu fungicides, though in cultures fructification was poor. Usually fungi sensitive to thiram were also sensitive to ziram, though not necessarily to zineb. *M.* sp. and *S. sarciniforme* were moderately susceptible to phthalic compounds and their use in all tests is recommended, though *M.* was about twice as sensitive to ziram as *S. sarciniforme*. If only 1 fungus is to be used, it should be *M.* sp.

Jarvis (W. R.). **The preservation of fruit chip baskets with copper-8-quinolinolate.**—*Plant Path.*, **9**, 4, pp. 150–151, 1 fig., 1960.

When chip baskets used at the Scottish hort. Res. Inst., Invergowrie, Dundee, for picking soft fruit were treated with 1 vol. 0·75% Cu-8-quinolinolate—conc. water repellents (cunilate wood seal) in 2 vol. of industrial white spirit (of good quality, or tainting of the fruit may occur [**40**, 144]), dipped for 8 sec. and dried for > 48 hr., their useful life was prolonged from 10 days to 10 weeks.

Steinkraus (K. H.), Crosier (W. F.), & Provvidenti (M. L.). **Gaseous ethylene oxide as a bactericide and fungicide in the treatment of seeds.**—*Proc. Ass. off. Seed Anal. N. Amer.*, **49**, pp. 159–166, 1959. [Received Feb. 1961.]

At N.Y. State Agric. Exp. Sta., Cornell Univ., Geneva, ethylene oxide [cf. **39**, 273, 545] for 30 min. freed seeds of aster, mung bean [*Phaseolus aureus*], pea, dandelion, and Sudan grass from mesophilic aerobic bacteria without injury. Though the germinability of some seeds is progressively adversely affected as exposure time is increased treatment even of these may be of value in producing a few disease-free plants which in turn will provide a large number of disease-free seeds. Some seeds, however, including lucerne, contained micro-organisms which were resistant to this treatment.

Taubet (N.) & Bartels (Marga). **Untersuchungen über die Bor-, Kupfer- und Manganaufnahme aus einer spurennährstoffhaltigen Saatgutbeize.** [Studies on the B, Cu, and Mn uptake from a micronutrient-containing seed dressing.]—*Landw. Forsch.*, **13**, 4, pp. 261–272, 3 graphs, 1960. [Engl., Fr. summ. 34 ref.]

Dynamal, a dry Hg preparation [**33**, 7; **38**, 363] manufactured by Chemische Werke Albert, Wiesbaden-Biebrich, Germany (where these studies were carried out), contains water-insoluble compounds of B (2·5%), Cu (17%), and Mn. Quantitative analysis of seedlings, pot plants, and harvested grain of Petkus rye and Flämingstreue oats revealed that of the 2·2 mg. Mn applied to the seed, 8·5% was absorbed and distributed through the seedlings; less than 1% of the 1·4 mg. Cu was translocated to the shoots but 6% passed into the shoots and roots, while in a pot

experiment with oats in Cu-deficient soil 9·3% of the Cu in the seed dressing was utilized as compared with 0·9% of $CuSO_4$ dressing; in 17-day-old plants B was detected only in the shoots, which had absorbed 20% of the 0·2 mg. applied.

Thus the trace elements in dynamal are able to counteract deficiency symptoms.

KRÜGER (W.). **Antibiotics as seed protectants (1958/59).**—*S. Afr. J. agric. Sci.*, **3**, 3, pp. 409–418, 1960. [Afrik., Fr. summ.]

Details are given of further tests at Coll. Agric. and Exp. Sta., Potchefstroom [cf. **39**, 389], in which some antibiotics were compared with conventional seed protectants against *Diplodia zeae* [*D. maydis*] on maize seedlings, *Aspergillus niger* and *Rhizopus* sp. on groundnut seedlings, and *Sphacelotheca sorghi* on sorghum. Growth of maize seedlings was adversely affected by most of the antibiotic solutions; slurries were less detrimental but also less effective against *D. maydis*, while actidione at > 10 i.u. ml. was highly toxic. Germination was improved by trigosan and thiulin, the former being the most effective treatment for *D. maydis*. Groundnut emergence was increased by filipin, thiolutin, trigosan, and thiulin. Sorghum kernel smut was controlled by slurries and powders of actidione, actidione A, S, and T, and by slurries (only) of filipin, P-165, and thiolutin.

KHARCHENKO (S. M.). Антибіотичні властивості видів секції **Monoverticillata** роду **Penicillium,** виділених з ризосфери сільськогосподарських рослин України. Повідомлення II. Антибіотичні властивості видів секції **Monoverticillata** роду **Penicillium** щодо фітопатогенних бактерій та грибів. [The antibiotic properties of species in the Monoverticillata sect. of the genus *Penicillium* isolated from the rhizosphere of agricultural plants in the Ukraine. Report II. The antibiotic properties of species in the Monoverticillata sect. of the genus *Penicillium* in relation to bacteria and fungi.]—*J. Microbiol., Kiev*, **22**, 5, pp. 45–51, 1960.

The antibiotic activity of 28 spp. (120 strs.) against 15 spp. (20 strs.) of phytopathogenic bacteria and 30 spp. of fungi was studied at Inst. Microbiol., Ukr. Acad. Sci. [cf. **39**, 173]. Most active against the bacteria were *P. thomii*, *P. waksmanii*, *P. multicolor*, *P. implicatum*, and *P. bilai*. Among those exerting a fungistatic action on chlamydospore germination of spp. of Ustilaginales were *P. thomii*, *P. waksmanii* and *P. multicolor*. Culture liquids from *P. thomii*, *P. implicatum*, *P. multicolor*, *P. spinulosum*, *P. lividum*, and *P. adametzii* inhibited spore germination of *Botrytis cinerea*, *Polyspora lini*, *Verticillium lateritium*, *Fusarium sporotrichiella*, and *F. oxysporum*.

THEDEN (GERDA) & SCHULTZE-MOTEL (MARLEEN). **Untersuchungen über sieben zur Prüfung der Schimmelwiderstandsfähigkeit von Werkstoffen benutzte Pilze.** [Investigations on seven fungi used for testing the mould resistance of industrial materials.]—*Angew. Bot.*, **34**, 3/4, pp. 133–157, 8 graphs, 1960. [25 ref.]

At the Bundesanstalt für Materialprüfung, Berlin-Dahlem, Germany, the development in culture of *Aspergillus amstelodami*, *A. niger*, *Chaetomium globosum*, *Paecilomyces variotii*, *Penicillium brevicompactum*, *P. cyclopium*, and *Stachybotrys atra* was studied with regard to temp. and humidity and to the nutrient medium without and with toxic admixture. At 30° C. growth of *P. brevicompactum* and *S. atra* was prevented in all or most media and that of *P. cyclopium* slowed down, the opt. temp. for these fungi being approx. 22°. In complex cultures of all the 7 fungi single spp., varying with the medium, tended to prevail over the rest, the predominance of *A. niger* being pronounced at 30°. The effects of diethyl-actyl Sn acetate, Na pentachlorophenolate, and salicylanilide in various concs. on mono- and complex cultures were evaluated; in the latter the order and the degree of prevalence differed from those observed in the cultures grown on atoxic media.

Plant quarantine announcements.—*F.A.O. Plant Prot. Bull.*, **8**, 12, pp. 150–155; **9**, 1, pp. 12–14, 1960.

Republic of Senegal. Phytosanitary control was instituted on the import and export of plant products by Decree no. 60–121 of 10 March 1960, published in the *J. off. Répub. Sénégal*, 26 Mar. 1960, details of which are given.

Pflanzenschutzbestimmungen in Deutschland. Pflanzenschutzbestimmungen im Ausland. Überholte Bestimmungen. [Plant protection regulations in Germany. Plant protection regulations abroad. Revised regulations.] —*Amtl. PflSch-Bestimm.*, N.F. **14**, 4, pp. 163–204, 1960.

This publication follows the usual lines [cf. **40**, 207].

Baldacci (E.). **Problemi e sviluppi attuali di patologia delle piante coltivate. Un rapporto di attività 1948–1958.** [Problems and developments to-day in the cultivated plants. A report of activities, 1948–1958.]—xv—202 pp., 17 pl., 2 plans, Milan, Istituto di Patologia Vegetale, 1960. [349 ref.]

This comprehensive report, based on contributions by workers at the Istituto di Patologia Vegetale, deals with its history and organization, and reviews the researches on general pathology and on various diseases and their control carried out during the period. Much of the work dealt with has been noticed.

Baldacci (E.) (Editor). **Malattie delle piante trasmesse per seme e mezzi di prevenzione.** [Seed-borne diseases of plants and their control.] —*Quad. Ente naz. Sem. elett.* 7, 36 pp., 26 fig., 1959. [Received Dec. 1960.]

This publication, intended mainly for agricultural technicians, briefly describes the macro- and microscopic examination of seed for the presence of disease, deals in general terms with disease control in crops grown for seed, and gives brief, useful notes on the symptoms, causal organisms, and control of the chief seed-borne diseases of crops grown in Italy. There is a section on seed disinfection and a list of some chemical products commonly used.

Friedman (B. A.). **Market diseases of fresh fruit and vegetables.**—*Econ. Bot.*, **14**, 2, pp. 145–156, 10 fig., 1960.

In this (1958) report [cf. **28**, 228; **39**, 512, 751] it is stated that 124 different kinds of fresh fruit and vegetables from 43 states and 22 territories and foreign countries (including S. Africa and Chile) arrived at New York City during the year by rail, truck, ship, and aeroplane. Rail carriers in U.S.A. reported loss and damage claims of $10,726,816 for 568,164 cars of fresh fruit and vegetables, an av. of $18.88/car. This included $1,346,492 for 163,869 cars of white potatoes; $802,779 for 11,775 cars of tomatoes; and $792,425 for 64,845 cars of lettuce. Deterioration during marketing was estimated at 21% for apples, 13% for grapefruit, 15% for oranges, 6% for peaches, 7% for pears, 13% for Lima beans [*Phaseolus lunatus*], 12% for cauliflower, 19% for celery, and 16% for potatoes. In 1956 credit allowances on depreciated stock given by a chain-store system to its retail outlets were: asparagus 3%, string beans [*P. vulgaris*] 7%, cabbage 6 and 4% for old and new crops, respectively, carrots 4%, mushrooms 8%, potatoes 6 and 4% for new and late crops, respectively, apples 5%, oranges 2%, and peaches 4%.

The forms of injury dealt with include, among others, those due to freezing, chilling, heat, humidity, soil conditions, and chemical and mechanical factors, as well as physiological disorders. The chief fungal and bacterial diseases are listed, with the hosts attacked and an indication of their seriousness. Brief reference is also made to virus diseases.

Trappe (J. M.). **Some probable mycorrhizal associations in the Pacific Northwest. II.**—*Northw. Sci.*, **34**, 4, pp. 113–117, 1960.

This continuation of an earlier paper [cf. **37**, 334] lists probable mycorrhizal associations between some agarics and boleti and *Pseudotsuga menziesii*, *Tsuga heterophylla*, deodar, *Pinus contorta*, *Abies amabilis*, *T. mertensiana*, *P. ponderosa*, *P. monticola*, *Populus tremuloides*, and *Salix scouleriana*.

Rubin (B. A.). Дыхание и его роль в иммунитете растений. [Respiration and its role in plant immunity.]—66 pp., 2 fig., 1 diag., 16 graphs, Moscow, Timiryazev Lectures 19, Acad. Sci. U.S.S.R., 1960. [155 ref.]

This review is based on the literature and on experimental data on the chemistry of plant respiration and the enzyme systems regulating it. The data indicate a direct close connexion between immunity [cf. **39**, 388] and respiration. Infection causes a profound reorganization of the oxidizing-reducing enzyme system, examined in detail.

On the whole, facultative parasites have a toxic effect on the host cells, reflected in the inactivation of individual elements of the oxidizing chain and in the disruption of the storage processes and of the effective use of respiratory energy. Resistance is determined firstly by the presence in the oxidizing system of the host of elements and chains which are not inhibited by toxins, and also of systems assuring the linking of oxidation with phosphorylization, irrespective of the action of the toxin directed to the disruption of this relation. Often the enzyme mechanism of the reaction consists in the activation of flavine respiration, coupled with the activation of peroxidase. Detoxication is very important in the protective role of the oxidizing systems.

Destruction of infected cells, resulting from the dislocation of the co-ordinated action of individual links of the respiratory circuit, may also serve to protect the host from infection. This type of reaction is characteristic of immunity from obligate parasites. The polyphenol-polyphenoloxidase system serves as a basic oxidizing-reduction mechanism used in these changes. Activation of this system is achieved by activation of both substrate and enzyme. The defence role of these conversions is brought about by the accumulation of quinones and their condensation products, often with the production of substances which are absent from healthy tissue. This type of substance is toxic to the host cells and the infecting agent.

It cannot be doubted that the oxidizing systems are not the only mechanism responsible for the whole complex of phenomena arising from the interaction between auto- and heterotrophic organisms.

Baldacci (E.), Betto (E.), Foa (R.), & Volpi (A.). **Absorption and transfer of phosphorus in healthy and diseased plants.**—P 1389 Italy, Reprinted from 2nd U.N. Geneva Conference, pp. 37–41, 2 fig., [? 1960].

Most of the information in this account of researches at Univ. Milan on the absorption of P^{32} has been noticed [cf. **37**, 334; **38**, 50].

Baldacci (E.) & Betto (E.). **Applicazione degli isotopi radio-attivi come traccianti in patologia vegetale.** [The application of radioactive isotopes as tracers in plant pathology.]—ex *Atti Congr. scient.* (*Sez. nucl.*), *V. Rass. internaz. elettron. nucl., Rome, 1958*, pp. 395–406, [? 1959. Received Dec. 1960.]

The authors review the results of studies at Univ. Milan [see above] and describe further experiments in which *Phaseolus vulgaris* plants were kept throughout at R.H. 60±5% or 95%, radioactive P being absorbed for 48 hr., and wounded with carborundum 2 and 12 days later. Autoradiographs taken 3 days after the wounding revealed the usual accumulation of P^{32} in the injured parts of the plants at

R.H. 60 ± 5%, injured after 2 days, but no accumulation in those at 95%, which correlates the process of accumulation with transpiration. With lesions made at 12 days there was no accumulation even at R.H. 60 ± 5%, confirming the view that in the healing of the wounded leaves the P requirement is met mainly from the medium rather than from the plant.

Darley (E. F.), Middleton (J. T.), & Garber (M. J.). **Phytotoxicity of gas mixtures. Plant damage and eye irritation from ozone-hydrocarbon reactions.**—*J. agric. Fd Chem.*, **8**, 6, pp. 483–485, 1960.

At Agric. Exp. Sta., Riverside, Calif., gas-phase reaction products of several ozone-hydrocarbon mixtures [cf. **36**, 537], including mono-olefins, a diolefin, and aromatics, were assessed for their relative capacity to damage Pinto bean [*Phaseolus vulgaris*] plants and cause eye irritation. Plant damage resulted from all reactions which yielded products containing 3 or more C atoms after cleavage of the double bond, but not from ozone reactions with propylene and 2-butene (1 and 2 C atoms). Phytotoxicity was markedly reduced by attachment of a methyl group at the double bond of a straight-chain olefine, but the level was not modified by a change from the *cis* to the *trans* form of a given mixture.

Ghosh (Gouri R.). **Comparative physiology of some representatives of the Gymnoascaceae.**—*Mycopathologia*, **13**, 3, pp. 161–180, 1960. [63 ref.]

The author (Ravenshaw Coll., Cuttack, Orissa, India) describes studies at Univ. Ill. on the nutritional requirements of representatives of 6 gen. of Gymnoascaceae in comparison with results reported from similar investigations on the Trichophytoneae and the Aspergillaceae [cf. **13**, 460; **29**, 474, *et passim*].

Macleod (D. M.). **Factors affecting the growth of the filamentous fungus, Hirsutella gigantea Petch.**—Abs. in *Proc. Canad. phytopath. Soc.*, **27**, p. 14, 1960.

At the Insect Path. Res. Inst., Sault Ste Marie, Ont., in further studies of the stimulatory effect of yeast extract and B vitamins [cf. **39**, 385] it was found that of 39 specific sources of N, acid-hydrolysed casein gave the max. growth, apparently due to growth factors, possibly peptides, present in it.

Alghisi (P.). **Influenza della composizione del substrato sull' accrescimento della Sclerotinia minor.** [Influence of the composition of the substrate on the growth of *S. minor*]. **Influenza del substrato di crescita sulla produzione di enzimi pectici da S. minor.** [Influence of the growth-substrate on the production of pectic enzymes by *S. minor*.]—*Riv. Pat. veg.*, Ser. 3, **1** (*1961*), 1, pp. 65–82, 1 pl., 11 graphs; pp. 83–99, 35 graphs, 1960. [Engl. summ. 27, 12 ref.]

S. minor [**40**, 227], isolated at Univ. Padua, Italy, from chicory growing in market-gardens at Chioggia, was able to grow in liquid and agar media lacking Mg, P, and some micro-elements usually considered essential. The absence of any one of the basic elements from liquid media induced merely sub-opt. growth.

When *S. minor* was grown in chemically defined liquid media without Mg, protopectinase and pectin-methyl-esterase activity were > in complete media, while without P and K there was a decrease of the 2 enzymes and also polygalacturonase. No significant variations occurred when micro-elements were omitted.

Toyama (N.). **Isolation and properties of cellulase from Trichoderma koningi.**—*Mem. Fac. Agric. Miyazaki Univ.*, **2**, 2, pp. 100–138, 3 fig., 25 graphs, 1960. [28 ref.]

Details are given of attempts to separate cellulase from other enzymes produced by cultures of *T. koningii* [*T. viride*: **39**, 9] and to determine its effect on celluloses and wood. Cellulase with only a trace of xylanase was obtained by ethanol fractionation at 40° C. and pH 2·4 of koji extract or synthetic culture filtrate.

JEREBZOFF (S.). **En relation avec la composition du milieu de culture Alternaria tenuis montre soit un rythme exogène de zonations, soit un rythme endogène de 50 h. Dépendance de la période du rythme endogène de zonations d'Alternaria tenuis auct. vis-à-vis de la température ou de la composition du milieu nutritif.** [According to the composition of the culture medium *A. tenuis* exhibits either an exogenous rhythm of zonations or an endogenous rhythm of 50 h. Dependence of the period of endogenous rhythm of zonations of *A. tenuis* in relation to the temperature or to the composition of the nutrient medium.] *C.R. Acad. Sci., Paris*, **252**, 1, pp. 163–165, 1 diag.; 2, pp. 782–784, 1 graph, 1961.

The endogenous zonation on malt lasted for 50 hr. at 23° and for 71 at 24·8° C. On malt + potato extract it developed within the same temp. limits with a period of 35 to 46 hr. in different experiments.

On potato extract zonations were produced [cf. **40**, 28 and below] only under 12-hr. periods of light but on malt extract they were a regular feature, occurring at 24 hr. intervals under photocycles and at 50 hr. in total darkness.

PAPAVIZAS (G. C.) & DAVEY (C. B.). **Some factors affecting sexual reproduction of Aphanomyces euteiches.** *Amer. J. Bot.*, **47**, 10, pp. 884–889, 1 fig., 3 graphs, 1960.

A brief account of this work has been noticed [**40**, 196].

HEPDEN (PAMELA M.) & HAWKER (LILIAN E.). **A volatile substance controlling early stages of zygospore formation in Rhizopus sexualis.**—*J. gen. Microbiol.*, **24**, 1, pp. 155–164, 3 fig., 1961.

At Univ. Bristol, cultures of *R. sexualis* at 20° C. produced an unidentified volatile substance which counteracts the inhibitory effect of low temp. (10° C.) on the early development of zygospores (*Op. cit.*, **17**, p. 758, 1957); its probable identity is discussed, and the method of its demonstration described.

LAST (F. T.). **Longevity of conidia of Botrytis fabae Sardiña.**—*Trans. Brit. mycol. Soc.*, **43**, 4, pp. 673–680, 2 graphs, 1960.

At Rothamsted exp. Sta. the max. number of conidia was produced by *B. fabae* [cf. **36**, 717; **40**, 4] on the 10th day after inoculation on an agar medium (g./l. H_2O: KH_2PO_4 1·52; $MgSO_4 7H_2O$, 0·52; $NaNO_3$, 6; KCl, 0·52; dextrose, 10; peptone, 2; casein hydrolysate, 3; yeast nucleic acids, 0·5; agar, 20). Conidia from cultures 25 and 35 days old were $\frac{1}{10}$ and $\frac{1}{100}$ as infective as those from 10-day-old cultures, though germination in water of conidia 10–40 days old was equally good. The infectivity of 40-day-old conidia was partially restored by suspension in 0·2% or more yeast extract, orange juice, glucose, etc.

RADHA (K.). **The genus Rhizoctonia in relation to soil moisture. II. Rhizoctonia bataticola, Cotton root rot organism.**—*Indian Cocon. J.*, **13**, 4, pp. 137–144, 2 pl., 1960.

A relative reduction in the microbial population of the soil (especially in *Aspergillus* spp.) with increased soil moisture was detected in 3 fields at the Koilpatti Cotton Res. Sta., Madras [cf. **38**, 536]. Under controlled conditions different levels of soil moistures had no significant effect on the total soil microflora, though excess was associated with low nos. of *A.* spp., especially *A. niger*.

Inoculation of sterilized soil with 4 spp. of *A.* affected to different extents the pathogenicity of *Macrophomina phaseoli* inoculated to French beans [*Phaseolus vulgaris*], *A. terreus*, *A. fumigatus*, and *A. nidulans* greatly reducing the germination of the seeds though *A. niger* increased emergence by 5%. At post-emergence, disease due to *M. phaseoli* was inhibited by *A. niger*, *A. terreus* exerting no effect,

and *A. fumigatus* and *A. nidulans* increasing infection from 36% to 75 and 58%, respectively.

M. phaseoli had least effect on germination of cotton seed at 70% soil moisture and the greatest at 30 and 90%.

The role of a thermostable and fungicidal metabolite of *A. niger* in suppressing the growth of *M. phaseoli* was demonstrated.

Garrett (S. D.). **Rhizomorph behaviour in Armillaria mellea (Fr.) Quél. III. Saprophytic colonization of woody substrates in soil.**—*Ann. Bot., Lond.*, N.S. **24**, 94, pp. 275–285, 1 fig., 1960.

In further studies [**35**, 706] autoclaved segments of willow shoots (*Salix alba* var. *coerulea*) were buried in moist soil before inoculation with *A. mellea*. Periods of burial up to 3 weeks did not affect availability of the willow to *A. mellea*, but longer burial reduced the substrate value. Living segments of willow were better substrates than dead, and their food value was unimpaired by 7 weeks of burial. These results are explained on the basis of the absence of competitors in living tissues, while in the colonization of dead tissue *A. mellea* has the advantage that it is able to utilize cellulose and lignin in contrast to the majority of soil fungi.

Soil sterilization.—*Bull. Minist. Agric. Lond.* 22, 49 pp., 4 pl., 12 fig., 2 graphs, 1959.

In this 5th edition [cf. **26**, 467] the text has been rewritten under the auspices of the Glasshouse Group of the N.A.A.S.; the various sections cover the effects of soil sterilization, sterilization by steam, sterilization by chemicals, soil treatment after sterilization, and the layout of soil sheds. There are 4 appendixes on various aspects of steam sterilization.

Rose (T. H.) & Dermott (W.). **Micro-nutrient deficiencies in arable crops in Romney Marsh. I.**—*Emp. J. exp. Agric.*, **28**, 112, pp. 281–293, 1 map, 1960.

In a survey by the N.A.A.S., Wye, Kent, in 1953 Mn deficiency was diagnosed in 35 of 172 fields inspected. It generally occurred in small patches. Slight B deficiency was found in 1 instance only When micro-nutrient sprays were applied, visual responses to Mn resulted in a number of crops. From 1954–6 significant increases in yield followed spraying with 0·5% $MnSO_4.4H_2O$ solution (approx. 1,250 p.p.m. Mn) in 3 of 8 wheat and 4 of 6 pea trials, but potatoes sprayed with 0·8% Mn sulphate solution (approx. 2,000 p.p.m. Mn) gave no increase in yield. On all but 1 of the sites which gave significant yield increases the crops bore visual symptoms of Mn deficiency.

An $MnSO_4$ spray substantially reduced incidence of marsh spot [cf. **37**, 616] in peas, though applied at an early stage. A $CuSO_4$ spray caused small but significant decreases in yield in 3 wheat experiments and 1 pea. No benefit may be expected from spraying crops on Romney Marsh with Zn or $CuSO_4$. In 5 of 6 potato experiments spraying with home-made Bordeaux mixture against blight [*Phytophthora infestans*] increased yields

Tóth (S.). **Adatok Magyarország mikroszkopikus gombáinak ismeretéhez. III.** [Contributions to the knowledge of microscopic fungi of Hungary. III.]—*Bot. Közl.*, **48**, 1–2, pp. 41–47, 1959. [Fr. summ.]

A list of Sphaeropsidales of 41 gen. (267 spp.) with hosts and localities.

Parmasto (E. Kh.). Трутовые грибы Эстонской ССР. [Polypore fungi of the Estonian S.S.R.]—*Ex* Plantae cryptogamae (*Acta Inst. bot. Acad. Sci. U.R.S.S.*), Ser. II, 12, pp. 213–273, 15 pl., 20 fig., 15 maps, 1959.

This list is based on collections during 1950–56 of 2,140 specimens from 37 regions of Estonia, and on those at the Estonian agric. Acad. and Tartu Univ. Dietrich's

exsiccata at Leningrad were also studied. After discussing growth conditions, giving a brief analysis, and assessing the economic importance of the Polyporaceae, the author describes (in Russian) 138 spp., indicating habitat, host range, collecting sites, etc. [cf. **40**, 29].

Gaponenko (N. I.). Некоторые данные о полезных и вредных грибах низовьев Аму-Дарьи. [Some data on useful and pathogenic fungi of the lower reaches of the Amu Darya.]—Узбек. биол. Ж. [*Uzbek. biol. Zh.*], *1960*, 5, pp. 11–16, 1960. [Uzbek summ.]

This report of a survey of the lower reaches of the Amu-Darya by Inst. Bot., Acad. Sci. Uzbek S.S.R., in 1946–7 and 1951–3, includes the following items. Among diseases of cotton, *Verticillium dahliae* [**39**, 580] was most widespread in 1949, with an av. of 30% infection in the Urgench region and 20% in the Kara-Kalpak area. In 1952 in some sections of collective farms in the Chimbaĭ and Kegeĭlin regions there was up to 40% infection and an av. 10% in the Kunya-Urgench region. Also noted on cotton were *Macrosporium* [*Alternaria*] *gossypii* and *Nigrospora gossypii*. Large-scale infection of lucerne by *Uromyces striatus* [**39**, 677] caused considerable losses and *Leveillula leguminosarum* f. *medicaginis* occurs in the Kara-Kalpak A.S.S.R. In 1949 an av. of 50% of lucerne plants were infected by *Pseudopeziza medicaginis* [**39**, 320], and there are also considerable losses in years with wet springs from *Peronospora aestivalis* [*P. trifoliorum*], with 30%, and sometimes 50% infection. About 30% of the sorghum crop is lost each yr, *Sorosporium* [*Tolyposporium*] *ehrenbergii*, *S. reilianum* [*Sphacelotheca reiliana*], and *S. sorghi* sharing in the damage. Poplar and willow were infected by heart rot—*Inonotus* [*Polyporus*] *hispidus* on poplar, *P. squamosus* and *Fomes fomentarius* on both. Heart rot occurs in the 'tugais' and in artificial plantations, with as much as 60% infection in some places.

Saxena (B. N.) & Maleki (Z.). **Leaf-infecting fungi of ornamental and allied plants of Uttar Pradesh : new records and host index.** *J. sci. Res. Lucknow Univ.*, **1**, pp. 11–22, 1959. [48 ref. Received Dec. 1960.]

Among the 84 fungus spp. listed on 85 hosts are 6 new host records for India found in Lucknow during 1955–57.

Agarwal (G. P.) & Beliram (R.). **Fungi causing plant diseases at Jabalpur (Madhya Pradesh)—II.** *J. Indian bot. Soc.*, **39**, 3, pp. 351–356, 2 fig., 1960.

Nos. 67–71 in this series from the Bot. Dept, Mahakoshal Mahavidyalaya [cf. **39**, 677], include one new sp. and *Curvularia lunata* on leaves in plantain (*Musa paradisiaca*) and on leaves and leaf sheaths of *Cymbopogon citratus*, new host records.

Chiddarwar (P. P.). **Contributions to our knowledge of the Cercosporae of Bombay State—II.**—*Indian Phytopath.*, **12** (*1959*), 2, pp. 111–121, 33 fig., [1960].

Among the 31 spp. listed on economic and ornamental hosts are *C. acalyphae* on *Acalypha ciliata*, *C. cajani* on pigeon pea, *C. gerberae* on *Gerbera jamesonii*, *C. gaillardiae* Chiddarwar on *Gaillardia pulchella*, *C. malayensis* on *Hibiscus esculentus*, *C. petuniae* var. *brevipedicellata* Chiddarwar on *Petunia variabilis*, *C. profusa* on *Acalypha indica*, *C. timorensis* on sweet potato, and *C. zinniae* on *Zinnia elegans*, as well as 9 other new spp. and 1 new var.

Jørstad (I.). **The Norwegian rust species arranged alphabetically after host families and host genera, with short descriptions, mainly of macroscopical characters.**—*Nytt Mag. Bot.*, **8**, pp. 103–146, 1960.

This valuable study includes a key to the genera of Uredinales known to occur in Norway [cf. **38**, 68].

Ramsfjell (T.). **Distribution of the genus Peronospora in Norway.**—*Nytt Mag. Bot.*, **8**, pp. 147–178, 2 fig., 1 map, 1960.

The spp. are listed under host families with the locality for each collection [cf. **39**, 159]. Distribution is also tabulated and there is a host index.

Baldacci (E.). **Development in the classification of Actinomycetes.** —*G. Microbiol.*, **6**, pp. 10–27, 1958. [44 ref. Received Dec. 1960.]

After reviewing earlier work [cf. **37**, 459; **38**, 583, *et passim*] the author discusses the characteristics useful in the classification of actinomycetes, notes the genera so far proposed [**39**, 680], expresses his views on series in *Actinomyces* and *Streptoverticillium*, and presents an annotated key to these.

Litvinov (M. A.). К систематике рода **Olpidium (Braun) Rabenhorst. (Ad systematicam generis Olpidium (Braun) Rabenhorst.)** [On the systematics of the genus *Olpidium*.]—*Ex* Plantae cryptogamae (*Acta Inst. bot. Acad. Sci. U.R.S.S.*), Ser. II, 12, pp. 188–212, 1959.

A key to 44 spp. of *Olpidium* and 8 doubtful or inadequately studied spp. is followed by descriptive details (in Russian) which include habitat, general distribution, and distribution in the U.S.S.R. Included are *O. brassicae*, occurring in the Leningrad region on *Brassica* and other hosts, and *O. trifolii* on *Trifolium repens* and *T. pratense* in many districts of the Soviet Union.

Vörös (J.) & Ubrizsy (G.). **A penészgombák Mucorales ; Hyphomycetes.** [Mould fungi; Mucorales and Hyphomycetes.]—*Mag. Kultúrfl.*, **1**, 8, pp. 1–124, 30 fig., 1960. [7½ pp. ref.]

A monograph, the main part of which (pp. 11–70) contains a classified treatment of the Mucorales and Hyphomycetes producing antibiotic and other substances. Large sections of this part are devoted to *Aspergillus* (26 spp.) and *Penicillium* (38 spp.) with Hungarian translations of keys from Thom & Raper's monographs [**25**, 141; **29**, 122]. The final chapt. (pp. 70–103) gives concise accounts of a number of antibiotics, arranged alphabetically.

Hubbes (M.). **Untersuchungen über die Valsaceengattung Valseutypella v. H.** [Studies on the Valsaceae genus *Valseutypella*.] *Phytopath. Z.*, **39**, 4, pp. 389–400, 4 fig., 3 graphs, 1960. [Engl. summ.]

At Inst. für spezielle Botanik, Eidg. Technische Hochschule, Zürich, *V. tristicha* from rose bushes produced perithecia *in vitro* on malt agar and also an imperfect state of the *Cytospora* type, not before recorded. Growth was stimulated by inositol +vitamin B_1 (in combination only), cotton wool extract, malt extract, and yeast extract. On rose twigs good growth, with pycnidia forming within 3 weeks and perithecia within 6 weeks, was obtained, but there was little growth on *Salix* or *Populus* twigs [cf. **40**, 252].

Batra (L. R.). **The species of Ciborinia pathogenic to Salix, Magnolia, and Quercus.** —*Amer. J. Bot.*, **47**, 10, pp. 819–827, 25 fig., 1960. [21 ref.]

As a result of further studies (at Swarthmore Coll., Penn.) the author presents a key to the known spp. of *Ciborinia* [cf. **38**, 676], with descriptive notes on those pathogenic to the 3 host genera, including *C. foliicola* in leaves of *S. humilis*, *C. gracilipes* in petals of *M. glauca*, and *C.* [*Sclerotinia*] *candolleana* on *Q. rubra* [**39**, 743]. *C. wisconsinensis* Batra, a new sp. on *Salix petiolaris*, forms sclerotia along the midrib, which germinate 1 yr. after infection, apothecia developing in late June. Sclerotia formed from mass ascospore ejections on potato dextrose agar produced apothecia.

Boedijn (K. B.). **Stigmatomycosis in Indonesia.**—*Mycopathologia*, **13**, 3, pp. 243–246, 2 fig., 1960.

Descriptions are given of 2 hemiascomycetes. *Eremothecium cymbalariae* and *Nematospora coryli*, isolated from citrus fruits in Java. The author recommends Spermophthoraceae, near the Endomycetaceae, for *Spermophthora*, *Eremothecium*, *Ashbya*, and 4 other gen. characterized by needle-shaped ascospores.

Butler (E. E.), Ogawa (J. M.), & Shalla (T.). **Notes on Gilbertella persicaria from California.**—*Bull. Torrey bot. Cl.*, **87**, 6, pp. 397–401, 1 fig., 1960.

In 1958 and 1959 *G. persicaria* [cf. **39**, 557] was isolated on several occasions from decaying peach fruits and once from a tomato fruit in Calif. The hyaline appendages were clearly visible on sporangiospores on potato dextrose agar. Cultures of the appropriate mating type produced strong lines of zygospores with cultures from Hesseltine [loc. cit.]. Calif.—isolates also formed zygospores with *Choanephora persicaria* from Baarn and with 1 culture of *Rhizopus stolonifer*. When 6 Calif. isolates were mated with + and − cultures of *Blakeslea trispora*, the results agreed with those of Hesseltine, except that zygospores did not form. Sporangiophores, unlike those observed by Hesseltine, were positively phototropic to white light. A few nodding or recurved ones were seen, but could not be considered typical for the sp.

Matuo (T.) & Sakurai (Y.). **On the nuclear phenomena in Fusarium lateritium (Nees) Snyd. et Hans. and the pathogenicity of the saltants.** *Res. Rep. Fac. Text. Seric. Shinshu Univ.*, **10**, pp. 14–20, 2 fig., 1960. [Jap. Abs. from Engl. summ.]

Most of the strs. of *F. lateritium* [*Gibberella lateritia*: **39**, 353] studied at the Lab. Phytopath. and Mycol. were uninucleate, a few had 2, 3, or 4 nuclei in each cell. Fewer saltants were produced by the uninucleate strs. A thiamine-deficient str. was more virulent than the parent str., but all those deficient for biotin or biotin + thiamine were less virulent.

Sakurai (Y.) & Matuo (T.). **Studies on the intraspecific groups in Fusarium solani. I. On mating populations and morphologic groups in the species.** *Res. Rep. Fac. Text. Seric. Shinshu Univ.*, **10**, pp. 21–32, 2 fig., 1960. [Jap. Abs. from Engl. summ. 27 ref.]

In reciprocal spermatizations between 6 forms and 2 races (of f. *radicicola*) of *F. solani* at the Lab. Phytopath. and Mycol., the only fertile cross was between f. *radicicola* race 2 and f. *pisi*. Under continuous illumination 4 types of macroconidia were obtained, namely, 5- or more septate (f. *cucurbitae*, f. *mori*, f. *xanthoxyli*), 3-septate mostly $< 5\mu$ wide (f. *pisi* and f. *radicicola* race 2), 3-septate mostly $> 5{\cdot}5\mu$ wide (race 1), and 4-septate unaccompanied by microconidia (f. *phaseoli*). The *Hypomyces* state of f. *pisi* was obtained.

Dade (H. A.). **Markers and finders.**—*J. Quekett micr. Cl.*, Ser. 4, **5**, 12, pp. 326–330, 2 fig., 1960.

Following a brief discussion of simpler methods of marking sites of interest on mounted slides a detailed description is given of Maltwood's finder (described in 1858), essentially a 1-in. sq. grid divided into 2,500 squares. Improvements on this basic design were made by Leitz (1927) 'after Becher'; more recently the 'England' finder has been produced by Graticules Ltd. These modifications are described and a method of converting Maltwood refs. on old slides to 'England' ones is given.

Hosch (L.). **Zwei Geräte zur Arbeitserleichterung und -beschleunigung bei den Reihenuntersuchungen über Viruskrankheiten der Pflanzkartoffeln.** [Two

implements to facilitate and speed up row examinations of Potato plants for virus diseases.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, **12**, 10, pp. 154–156, 2 fig., 1960.

A description from the Pflanzenschutzamt, Hannover, Germany, of a motor-driven press for extracting leaf sap and a device for washing centrifuge tubes.

Klinkowski (M.). **Die wirtschaftliche Bedeutung pflanzlicher Virosen.** [The economic significance of plant viroses.]—*Angew. Bot.*, **34**, 3-4, pp. 165–178, 1960.

A general account from the Deutsche Akademie der Landwirtschaftswissenschaften, Berlin, Germany, of the past and present incidence and a survey of the related research.

Hunnius (W.). **Möglichkeiten in der Bekämpfung pflanzlicher Viruskrankheiten.** [Possibilities in the control of plant virus diseases.]—*Bayer. landw. Jb.*, **37**, 4, pp. 393–410, 1960. [24 ref.]

This general survey [cf. **38**, 735; **39**, 287, 681], delivered as a lecture at the Regional Seed breeding Inst., Weihenstephan, in Dec. 1959, deals with 2 approaches to the problem of control: (*a*) direct aimed at the immediate curing of the plant, and (*b*) indirect, by protection against infection, control of vectors, and breeding for resistance.

Spirin (A. S.). О химической природе инфекционности вирусов. [On the chemical nature of the infectivity of viruses.] —*Adv. mod. Biol. Moscow*, **50**, 3(6), pp. 261–276, 1 fig., 1960. [2 pp. ref.]

In this review the topics considered are 'The principles of the structural organization of viruses', 'The role of the virus nucleo-protein in the infectivity of viruses', 'The role of the protein and nucleic acid components of the virus nucleo-protein in the reproduction of viruses', 'The infectious activity of nucleic acid isolated from the virus', 'Virus nucleic acid *in vivo*', and 'On the mechanism of virus infection'. The author concludes that all recent experimental data indicate that the chemical nature of the infectivity of viruses must be looked for primarily in the specific structure of the nucleic acid component.

Baldacci (E.) & Betto (E.). **Tecniche di visualizzazione dei virus delle piante.** [Methods for observing plant viruses.]—*Ann. Microbiol. Enzimol.*, **9**, 5–6, pp. 338–342, 3 fig., 1959. [Received Dec. 1960.]

A note on the use of the electron microscope [cf. **37**, 244; **38**, 585; *et passim*] with reference to work at Univ. Milan on tobacco mosaic, potato X, and potato Y viruses on tobacco.

Yarwood (C. E.). **Topical susceptibility of plants to viruses.**—*Virology*, **12**, 2, pp. 245–257, 1 fig., 1 graph, 1960. [23 ref.]

Some of this information from Univ. Cal., Berkeley, has been noticed [**40**, 212]. Beans (*Phaseolus vulgaris*) were more susceptible to 3 viruses [cf. **39**, 222] when inoculated on the upper than on the lower surface of the 1st leaves, though sunflowers were more susceptible on the lower. Inoculation of the stems of beans or cowpeas with the viruses of peach yellow bud mosaic, peach ring spot, the cowpea str. of tobacco mosaic, tomato spotted wilt, or white clover mosaic caused systemic symptoms of greater severity, more rapid appearance, and affecting a greater proportion of the test plants than inoculation of the leaves, hypocotyls, or roots. When beans or cowpeas were inoculated with tobacco necrosis virus via the leaves, the reduction in plant growth was greater than when infected via the petioles,

stems, hypocotyls, or roots. Local lesions of tobacco necrosis virus were larger on bean stems and petioles than on hypocotyls.

YARWOOD (C. E.). **Localized acquired resistance to Tobacco mosaic virus.**—*Phytopathology*, **50**, 10, pp. 741–744, 4 fig., 1 graph, 1960.

At Dept Plant Path., Univ. Calif., Berkeley, local lesions of TMV on Pinto bean (*Phaseolus vulgaris*) ceased growing 2 days after inoculation, while on *Nicotiana glutinosa* they continued to expand. A zone of virus-free tissue extending 2 mm. beyond the bean lesions was resistant, though somewhat inconsistently so, to further inoculation with TMV, but not with lucerne mosaic or tobacco necrosis viruses. No such zone developed on TMV-infected *N. glutinosa*. Occasionally, further symptoms, including a 'green island' effect induced by heating occurred on TMV-infected bean leaves beyond the lesions [cf. **38**, 502], indicating various changes in the immunized tissue.

FARKAS (G. L.), KIRÁLY (Z.), & SOLYMOSY (F.). **Role of oxidative metabolism in the localization of plant viruses.**—*Virology*, **12**, 3, pp. 408–421, 1 graph, 1960. [31 ref.]

Notes on studies at Res. Inst. for Pl. Prot., Budapest, Hungary, on tobacco mosaic, cucumber mosaic, tobacco necrosis viruses, and the para str. (Köhler & Pánjan, *Ber. dtsch. bot. Ges.*, **61**, pp. 175–180, 1943) of tobacco mosaic.

MACKINNON (J. P.). **Time of movement of Potato leaf-roll and Turnip latent viruses out of leaves of Physalis floridana Rydb.**—*Canad. J. Microbiol.*, **6**, 6, pp. 679–680, 1960.

In further tests at the Canada Dept Agric., Fredericton, N.B. [**40**, 291], in which each aphid-inoculated leaf was removed after intervals of time, potato leaf roll virus and turnip latent [*Physalis floridana* yellow net] virus [**40**, 31] took 24 hr. and sometimes 48 hr. to move less than 5 cm. from the site of inoculation to the main stem, thus resembling mechanically-inoculated viruses in rate of movement. It is suggested that the belief that these viruses are injected into the phloem may need reassessment.

MARAMOROSCH (K.). **Leafhopper-transmitted plant viruses.**—*Protoplasma*, **52**, 3, pp. 457–466, 1960. [69 ref.].

In this review [cf. **40**, 31] work during 1953–59 is critically discussed. Topics include purification and serology, transmission and multiplication, cross-immunization in vectors, site of virus multiplication, tissue culture, diseases of vectors, [tomato] stolbur and related viruses, electron microscopy of aster yellows virus, clover phyllody, aster yellows strs., gibberellic acid treatments, disease symptoms induced by leafhopper feeding, beneficial effect on insects, leafhopper-borne viruses in Australia, pseudo-curly top, recent work in Japan, and a proposal for an international virus-vector laboratory.

DYSART (R. J.) & CHAMBERLAIN (D. W.). **Studies on transmission of Tobacco ringspot virus on Soybean and weed suscepts.**—*Plant Dis. Reptr*, **44**, 12, pp. 952–954, 1 fig., 1960.

In fully detailed inoculation tests at Urbana, Ill., 2 new hosts, *Abutilon theophrasti* and *Polygonum hydropiperoides*, proved susceptible to tobacco ring spot virus, while 7 other common weeds did not [cf. **39**, 647]. Attempts to transmit the virus from diseased to healthy soybeans by various arthropod vectors were all unsuccessful.

TEAKLE (D. S.). **Association of Olpidium brassicae and Tobacco necrosis virus.**—*Nature, Lond.*, **188**, 4748, pp. 431–432, 1960.

At Dept Plant Path., Univ. Calif., Berkeley, *Olpidium brassicae* [**39**, 762] was

detected in the roots of *Cleome spinosa*, *Fragaria vesca*, *Chenopodium amaranticolor*, tobacco, and French bean [*Phaseolus vulgaris*] infected by tobacco necrosis virus. When lettuce, cowpea, French bean, cabbage, cucumber, and tobacco were inoculated with *O. brassicae* and the virus simultaneously in the laboratory virus infection of the roots was much greater than when the virus was used alone. It is possible, therefore, that *O. brassicae* acts as a vector or an agent predisposing roots to infection.

Brunt (A. A.) & Kenten (R. H.). **Mechanical transmission of Cocoa swollen-shoot virus.**—*Virology*, **12**, 2, pp. 328–330, 1960.

At W. Afr. Cocoa Res. Inst., Tafo, Ghana, *Adansonia digitata* and *Bombax brevicuspe* seedlings were infected with swollen shoot virus by *Pseudococcus njalensis* and harvested 2–10 and 20–30 weeks later, respectively. They were kept at a very low light intensity for 24–48 hr. before harvest. Infected leaves, from which the primary and secondary veins had been removed, were vacuum-infiltrated with a cold sol. containing phosphate, cysteine, and usually ethylenediamine tetraacetate. After the 1st vacuum infiltration the sol. was poured off and the leaves re-infiltrated with a fresh sol. After draining they were ground in a chilled mortar with hyflo super cel, and the slurry applied to the embryo and inner surface of cacao half-beans, which were washed and next day planted. Transmissions were obtained in 7 of 17 experiments.

By the same method transmissions were made from infected to healthy *A. digitata* seedlings with inocula prepared by centrifuging the slurry for 5 min. at 8,000 *g*. and concentrating the supernatant by dialysis against sucrose sol. for 2–3 hr., and after conc. of the clarified extract by ultra-filtration.

Turner (P. D.). **Strains of Phytophthora palmivora (Butl.) Butl. from Theobroma cacao L. I. Isolates from West Africa.** –*Trans. Brit. mycol. Soc.*, **43**, 4, pp. 665–672, 1 pl., 1 graph., 1960.

Further details are given of studies at the W. Afr. Cocoa Res. Inst., Ghana, the results of which have been noticed [**39**, 685].

Neururer (H.). **Möglichkeiten zur Verhütung von Getreidekrankheiten.** [Possibilities of preventing cereal diseases.]—*Pflanzenarzt*, **13**, 7, pp. 63–68, 1960.

In this review from the Bundesanstalt für Pflanzenschutz, Vienna, a list is given of all the cereal vars. grown in Austria with their gradings for resistance to 7 common diseases, the preparations recommended for seed treatment, and a discussion on control by soil treatment, rotations, opt. storage conditions, and care of young seedlings.

Marinich (P. E.). Лучшие сорта зерновых культур. [The best varieties of cereal crops.]—152 pp., 66 col. pl., Moscow, Min. Agric. R.S.F.S.R., 1958. Roubles 6.50.

Brief descriptions (each accompanied by a coloured plate of the spike and grain) are given of the best vars. of winter wheat, rye, and barley, hard and soft summer wheat, maize (and hybrids), oats, summer barley, millet [*Panicum miliaceum*], and buckwheat, including resistance to various fungus, bacterial and virus diseases and regions approved for planting.

Hansen (L. R.). **Vekstfölgens betydning. Vekstfölgens betydning for fotsykesoppene på korn.** [The importance of crop rotation. The importance of crop rotation for foot rot fungi on cereals.]—*Nord. JordbrForskn. 1960, Suppl.* 1, pp. 269–271, 1960.

Since 1950 foot rot has been the cause of increasingly heavy damage in E. Norway,

where monocultivation of cereals has largely replaced crop rotation. The principal results of a 3-yr. experiment (1955–57) on the rotational use of oats, barley, wheat, and oil-bearing crops (white mustard, rape, and colza) are presented. *Ophiobolus graminis* and *Cercosporella herpotrichoides* [**38**, 136] occurred in all the fields, while *Rhizoctonia* [*Corticium solani*] was isolated from barley and wheat with sharp eyespot, injury from which, however, was not appreciable. Neither *O. graminis* nor *C. herpotrichoides* attacked Blenda oats. Wheat was significantly more susceptible than barley to *O. graminis* in 1956, and in 1957 a similar relationship was observed in comparatively mild attacks (where oats was the preceding crop), but there were no differences in severe infection (following barley or wheat). The straw of both crops proved equally susceptible to foot rot (mainly *C. herpotrichoides*) irrespective of the forerunner in the rotation. In 1957 the pathogen was conspicuous during the latter half of July, i.e. about a fortnight after ear formation.

In 1956 there were no significant differences between oats and oil-producing crops or between barley and wheat as predecessors for the 3 cereals in respect of infection by *O. graminis* and yield. In barley and wheat, however, both factors were affected by cultivation immediately after oats – oil-bearers or barley + wheat; in the most severely infected field the 2 crops yielded 139 kg. decare more seed following the former combination.

Stapel (C.). **Det falske sædskifte og dets plantepatologiske betydning.** [False crop rotation and its plant-pathological significance.] —*Norsk. Jordbr Forskn.*, *1960*, *Suppl.* 1, pp. 274–279, 1960.

The problem of 'false' in the sense of 'parallel', 'undesired' crop rotation is discussed in relation to some concrete examples observed in Denmark. In the spring of 1960 a red clover field contained about 10 small swede plants/sq. m., some of which bore club root (*Plasmodiophora brassicae*). Scattered colza plants (1/sq. m.) were also noted in a field where the crop was cultivated 10 yr. ago.

Beet, like legumes and crucifers, retains its germinability in the soil for lengthy periods, constituting a potential source of infection by *Pythium* spp. and other pathogens, notably after a mild winter such as that of 1959–60.

The same conditions were conducive to outbreaks of foot rot (*Ophiobolus graminis* and *Cercosporella herpotrichoides*) in summer cereals [see above], infection being spread by the survivors of the winter crop. Overwintering barley plants are nearly always heavily infected by *Rhynchosporium secalis*, which may spread to adjacent summer barley crops.

Potatosova (Mme E. G.). Тифулез озимых культур. [Typhulosis of winter crops.] —Труд. всес. Инст. Защ. Раст. [*Trud. vses. Inst. Zashch. Rast.*], *1960*, 14, pp. 135–142, 4 fig., 1960.

Further observations [cf. **39**, 678; **40**, 85] in Latvia, and the Leningrad, Moscow, Penza, Kirov, Pskov, and Tatar regions of U.S.S.R., showed a notable incidence of *Typhula itoana* and *T. idahoensis* on winter wheat and rye in certain areas (25–40% in the first 2 named). Sclerotia of *T. itoana* were also found on overwintering oat, maize, and vetch (*Vicia satira*) stems, and of both also on other hosts, including especially some wild grasses and weeds, and also on plant debris. They grew in culture, respectively, at 0–18° (opt. 10°) and 0–16° (opt. 10°). The development of sclerotia and mycelium of both spp. was stimulated by diffuse light but inhibited by direct sunlight.

Slykhuis (J. T.). **Agropyron mosaic as a disease of Wheat in Ontario.**—Abs. in *Proc. Canad. phytopath. Soc.*, **27**, p. 16, 1960.

In S. Ont. *Agropyron* mosaic virus (AMV) [cf. **33**, 285] is common on *A. repens* and occasional on wheat, where some strs. produce more severe chlorosis but less severe

stunting than wheat streak mosaic virus (WSMV). Oats are susceptible to WSMV but not to AMV, while the reverse holds for *A. repens*. AMV developed more rapidly in wheat at 10–15° C., similarly to WSMV at 20–25°, and more slowly at 30°. The thermal death point for AMV was 10 min. at 50° and for WSMV 10 min. at 60°. Particles of the 2 viruses [cf. **39**, 161] were similar in shape but those of AMV were thicker and longer. *Aceria tulipae* [**39**, 224] transmitted WSMV but not AMV, which was transmitted by eriophyid mites. Strs. of AMV were synergistic in combination with all except 1 of the strs. of WSMV when tested on wheat.

Heyne (E. G.). **Registration of improved Wheat varieties, XXIV.**—*Agron. J.*, **52**, 11, pp. 655–658, 1960.

The 13 vars. described [cf. **39**, 295] include Conley (Reg. No. 388), a hard, red, spring wheat developed by N. Dakota agric. Exp. Sta. and the Crops Res. Div., with good resistance to the important races of stem rust [*Puccinia graminis*], including 15 B, at av. temps.; Avon (No. 389), a soft, white, winter wheat developed by Cornell Univ. and the Crops Res. Div., resistant to loose smut [*Ustilago nuda*] and common [*Tilletia caries* and *T. foetida*] and dwarf bunt [*T. contraversa*]; and Genesee (No. 391), a soft, white, winter wheat (Cornell Univ. and the Crops Res. Div.) resistant to loose smut. Colorow (No. 399) with outstanding resistance to bunts exceeded Cheyenne and Wasatch in yield.

Grewal (J. S.) & Vir (D.). **Efficacy of different fungicides. II. Field trials in relation to Wheat rusts.**—*Indian Phytopath.*, **12** (*1959*), 2, pp. 168–171, [1960].

In plot trials at the Div. Mycol. and Plant Path., Indian agric. Res. Inst., New Delhi [cf. **38**, 567], 9 fungicides were sprayed on susceptible C 518 wheat plants which were dusted with uredospores of 8 races of *Puccinia graminis* in French chalk 2 days later. Natural infection by *P. triticina* [*P. recondita*] developed. The results are tabulated for 1957–58 and 1958–59. Four applications of parzate—$ZnSO_4$ ($\frac{1}{2}$ gal. + $\frac{3}{4}$ lb., 100 gal. acre) at 2-week intervals reduced infection by both rusts from light (1958) or heavy (1959) to trace, with corresponding increases in yield (22·6 and 26·66 maunds/acre compared with 17·57 and 15·7).

Birnie (Georgette). **Rust-resistance in some induced mutations of the New Pusa Wheats 797, 798 and 799.**—*Euphytica*, **9**, 3, pp. 290–292, 1960. [Dutch summ.]

Fully awned as well as several other radiation mutants derived from material treated with P^{32}, S^{35}, X-rays and thermal neutrons were inoculated as seedlings with single races of *Puccinia graminis* and *P. triticina* [*P. recondita*: **40**, 10] at the Indian agric. Res. Inst., New Delhi [cf. above]. All retained the resistance of the parent vars. and 1, an awned mutant of N.P. 797 (plant No. 1–4–5), was highly resistant to races 10, 20, and 63 of *P. recondita* to which the parent str. is susceptible. There is little possibility that this additional resistance owes its origin to cross-pollination [cf. **39**, 101].

Heard (T. G.). **Stem rust of Wheat. Progress towards complete resistance.**—*J. Agric. S. Aust.*, **64**, 4, pp. 134–135, 140, 1960.

After pointing out that current weather conditions made it possible for stem rust [*Puccinia graminis*: cf. **39**, 372, 546] to attack wheat in S. Australia [cf. **35**, 664] in the 1960–1 season, the author notes the symptoms and discusses control through the use of resistant vars. Rust years are less common and usually less severe in S. Australia than in southern Queensland and northern New South Wales. It is over 10 yr. since the disease caused heavy loss in S. Australia [cf. **30**, 19]. At Roseworthy Coll. resistance from Festival, one of the few vars. still resistant, has been incorporated into new wheats.

Sibilia (C.) & Basile (Rita). **Graminacee spontanee attaccate da ruggini, raccolte in Italia nel 1959.** [Wild grasses attacked by rusts, collected in Italy in 1959.] —*Boll. Staz. Pat. veg. Roma*, Ser. 3, **17** (*1959*), 2, pp. 117–125, 1960. [Engl. summ. 32 ref.]

Continuing earlier work on this subject [**16**, 593], the authors identified races 11 and 14 of *Puccinia graminis* var. [f.sp.] *tritici* [**40**, 36] on *Agropyron repens*, 24 on *Avena barbata*, and 34 on *Hordeum murinum*, from 29 specimens collected in various regions from the Alps to Sicily.

A proposed modification of the system of Wheat leaf rust race identification and nomenclature. —*Robigo*, *1960*, 10, pp. 2–7, 1960. [Span. transl.]

A committee of 6 N. American workers on *Puccinia recondita* has agreed to adopt the suggestion of Stakman, E. C. & Stewart, D. M. (*Mem. Coop. Rust. Lab. U.S. Dept Agric. Res. Serv.*, 1957) of adding supplementary differentials but to try on an experimental basis a different system of nomenclature. The differentials will be: test vars. (possibly to be used as supplementary differentials) [listed], supplemental differentials, and standard differentials. The designation of a race will consist of 3 parts, separated by hyphens: (1) a race no. indicating reaction to 8 standard differentials, (2) an area and year designation indicating the specific set of supplemental differentials used in a given area in a given yr., and (3) a race no. in a consecutive series of cultures recognized from (2).

Da Silva (A. R.), Coelho (E. T.), & Da Silva (A. V.). **Identification of races of the Wheat leaf rust in Brazil, using a new group of varieties.**—*Robigo*, *1960*, 10, pp. 7–22, 1960. [Port. & Span. transl.]

At the Inst. Agron. do Sul, Rio Grande do Sul, Brazil, the results of testing 586 isolates of *Puccinia recondita* [**35**, 6] on 8 previously recommended differentials [**33**, 663; **38**, 685] and the occurrence of 24 races in 1952, -53, -55, -56, and -57 are presented [cf. Da Silva, **39**, 403]. The race designations are preceded by I.A.S. (Inst. agron. Sul) to avoid confusion with international nomenclature [see above].

Basile (Rita). **Relazione quinquennale (1953–1957) sulle razze fisiologiche di Puccinia recondita Rob. ex Desm. [= P. rubigo-vera (DC.) Wint. f.sp. tritici (Erikss.) Carl], in Italia.** [Quinquennial report (1953-57) on the physiologic races of *P. recondita* in Italy.] —*Boll. Staz. Pat. veg. Roma*, Ser. 3, **17** (*1959*), 2, pp. 127–140, 1 map, 1960. [Engl. summ. 51 ref.]

In all, 62 races of *P. recondita* [cf. **39**, 687] were identified on wheat, falling into 18 'unified groups' [cf. **37**, 31], of which group 17 (races 45, 47, 85, 140, 143, 167, 176) was the most virulent. Their distribution in Italy is detailed. The most common race was 176.

Samborski (D. J.) & Peturson (B.). **Effect of leaf rust on the yield of resistant Wheats.**—*Canad. J. Pl. Sci.*, **40**, 4, pp. 620–622, 1960.

At Canada Dept Agric., Winnipeg, Man., infection of the susceptible wheat Thatcher with *Puccinia recondita* caused a loss in yield of 58%, while infection of the resistant vars. Selkirk, Thatcher × Frontana, and Selkirk × Exchange caused losses ranging from 12–28%. There is a direct relation between density of inoculum and amount of necrosis on vars. which are resistant but not immune.

Doling (D. A.). **Physiologic race surveys.**—Abs. in *Trans. Brit. mycol. Soc.*, **43**, 4, p. 697, 1960.

The importance of determining the occurrence and distribution of physiological races in connexion with varietal resistance programmes is emphasized. The major disadvantages of studies to determine the relative frequency of races include the appearance of different ones as the season advances (as in *Phytophthora infestans*)

and different levels of infection in partially resistant vars. (as in *Puccinia glumarum* [*P striiformis*] on winter wheat). It is more important to ascertain presence or absence in a particular locality rather than relative frequency. The regular observation of small plots of differential wheat vars. throughout the country by the N[at.], I[nst.], a[gric.], B[ot.] has enabled the races of *P. striiformis*, their distribution, and contribution to an epidemic to be determined each season.

Fialkovskaya (Mme E. A.). Определение устойчивости Пшеницы против пыльной головни на ранних этапах заражения. [The determination of the resistance of Wheat to loose smut in the early stages of infection.]—Бюлл. Укр. н.-и. Инст. Раст. Селек. Генет. [*Byull. Ukr. nauch.-issled. Inst. Rast. Selek. Genet.*]. *1958*, 2, pp. 117–120, 1958.

Experiments showed that resistance of summer wheats to *Ustilago tritici* [*U. nuda*: **39**, 688] may be indicated by the intensity of spore germination on the stigmata. This initial reaction of the host appears to be a decisive factor regardless of later development. The method can sometimes be used for the quick assessment of resistance of lines of wheat having other useful characters.

Szczypiński (W.), Witkowski (W.), & Słabęcka (Mme D.). **Badanie zapraw rtęciowych i bezrtęciowych przeciwko śnieci cuchnącej Pszenicy (Tilletia tritici Wint.).** [Investigations on mercurial and non-mercurial dressings against stinking smut of Wheat (*T. caries*).]—*Roczn. Nauk rol.*, Ser. A. **79**, 4, pp. 989–1008, 10 graphs, 1959. [Russ., Engl. summ.]

In tests by Inst. Plant Prot., Puławy, Poland [cf. **40**, 162], thiram, tritisan, quintozene, spergon, and phygon were as effective as the organo-mercurials agrosan and betoxin F.

Tinline (R. D.). **Pathogenic and cultural variation in Cochliobolus sativus.**—Abs. in *Trans. Brit. mycol. Soc.*, **43**, 4, pp. 696–697, 1960.

The 3 mechanisms causing variation in *C. sativus* [**39**, 690], viz. mutation (in monoascosporic isolates), heterokaryosis (in multinucleate, multicellular conidia), and hybridization, are briefly described. Progeny from a white-spored, poorly sporulating, weakly virulent str. × a dark-spored, densely sporulating, highly virulent str. had various combinations of the parental characters. When isolates with similar virulence were paired, 25% of the progeny had greater or less pathogenicity than the parents, but only 3% of single-spore cultures from parental clones were significantly different in virulence.

Ivanchenko (M. Ya.). Возбудители фузариоза Пшеницы и их сумчатая стадия в Северной Осетии. [Causal agents of *Fusarium* diseases of Wheat and their ascal state in N. Ossetio.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 12, pp. 26–28, 4 fig., 1960.

At N. Ossetin agric. Inst., U.S.S.R., perithecia of *F. graminearum* and *F. moniliforme* were found on the ears of wheat overwintered in the field and were identified, respectively, as *Giberella saubinetii* [*G. zeae*] and *G. fujikuroi*. *F. avenaceum* var. *graminum* was also isolated from ears and grains. Thorough gleaning, deep tilling, and seed treatment with dry compounds, particularly granosan [cf. **38**, 510], are recommended for control.

Smalij (V. T.). Вплив ризосферних бактерій на прорастання насіння та ріст проростків Пшениці. [The effect of rhizosphere bacteria on seed germination and shoot development of Wheat.]—*J. Microbiol., Kiev*, **22**, 5, pp. 20–24, 1960. [Russ. summ.]

At Inst. Microbiol., Ukr. Acad. Sci., winter and summer wheat seed was treated with different spp. and strs. of rhizosphere bacteria and then germinated on plain

agar. Most bacteria tested, especially *Pseudomonas* spp. [**38**, 510], improved germination and growth; water extracts were as effective as cultures. The active principle of the extracts was not destroyed by heating at 80° C. for 1 hr. Rhizosphere bacteria increased yield of summer wheat, improved grain quality, and raised P and N content. Bacterization of seed was more effective than introduction into the soil.

PEDERSEN (P. N.). **Methods of testing the pseudo-resistance of Barley to infection by loose smut, Ustilago nuda (Jens.) Rostr.**—*Acta agric. scand.*, **10**, 4, pp. 312–332, 2 fig., 1 plan, 1960.

From the Royal Veterinary and agric. Coll., Copenhagen, a description is given of 2 methods for determining the pseudo-resistance of barley vars. to *U. nuda* [**36**, 19], one based on infection tests in the field in which blocks of test vars. were separated by rows of inoculated material, and the other, the anther method, based on the number of florets which opened during flowering [cf. **39**, 693] and therefore became infected. The criterion of open or closed flowering is whether or not the anthers are discharged after anthesis.

A total of 333 determinations made by both methods on 203 vars. in 1951–57 showed a good correlation with the anther test and a somewhat poorer one with the infection test, the results of which were affected by a non-uniform spore distribution and by lodging, though not enough to disturb the good agreement between the replications in the test field. There was a close correlation between the results of the 2 methods in 1952, 1953, 1956, and 1957. The poorer correlation in 1954 was no doubt due to the unusually rainy conditions, in 1955 partly to lodging and partly to the period of spore dispersal occurring late in relation to flowering. It is concluded that the anther method is more reliable, rapid, and cheaper than the infection method but is applicable only to 2-rowed vars.

MORTON (D. J.), TOOL (E.), & HAGEN (I. K.). **Procedure and effectiveness of the Barley embryo test for loose smut used in North Dakota.**—*Plant Dis. Reptr*, **44**, 10, pp. 802–803, 1960.

Further details are given of the method employed at N. Dak. agric. Coll., Fargo [**40**, 164], for detection of infection by *Ustilago nuda* [cf. **38**, 318]. When the results were compared with field maturity tests a correlation coefficient of 0·946 was obtained, significant at 1%.

NAGUIB (K.) & GAYED (S. K.). **A physiological study on the toxicity of culture filtrate of Helminthosporium sativum P.K. & P.** *Mycopathologia*, **13**, 3, pp. 247–255, 3 graphs, 1960. [21 ref.]

As unpublished studies by Gayed at Baarn, Netherlands, showed that the symptoms of leaf spot (*H. sativum*) [*Cochliobolus sativus*] could be reproduced by dipping barley plants in a culture filtrate of the fungus [cf. **36**, 757], a possible correlation between the N constituents of the filtrate and its ability to induce wilt in lupin seedlings was investigated. The fungus was grown on a modified Fries' No. 3 medium with $NaNO_3$ or NH_4Cl or an equivalent mixture of both. The N content and its wilt-inducing capacity were recorded for 34 days. The former reached a min. and then rose. Only a partial apparent correlation could be established between the trend in the wilt-inducing capacity of filtrates obtained after different periods of incubation and the trend in change of N content. Apparently the toxicity is due to several substances, one a N product, and the degree of toxicity depends on the relative amounts of this and other substances present.

LAMBERT (J. W.). **Registration of Barley varieties, XV.**—*Agron. J.*, **52**, 11, pp. 661–662, 1960.

In this further announcement [cf. **38**, 254] of 5 vars. is Liberty (Reg. No. 49),

selected at S. Dakota agric. Exp. Sta. and stated to be resistant to the prevalent races of stem rust [*Puccinia graminis*: cf. **37**, 272] and powdery mildew [*Erysiphe graminis*: cf. **39**, 301].

Moseman (J. G.) & Schaller (C. W.). **Genetics of the allelic series at the $M1_a$ locus in Barley and cultures of Erysiphe graminis f.sp. hordei that differentiate these alleles.**—*Phytopathology*, **50**, 10, pp. 736–741, 1960.

Further studies at Beltsville, Md, and the agric. Exp. Sta., Davis, Calif. [cf. **40**, 220], showed that the gene $M1_a$ in Algerian barley conditioned resistance to cultures CR3 and 061 of the pathogen. A gene in Ricardo conditioning resistance to CR3 but not 061 was considered to be allelic and was designated $M1_a3$. Culture CR3 had 2 avirulent genes, A_a and A_a3, and 061 an avirulent gene A_a and a virulent one V_a3.

Watson (Marion A.) & Mulligan (T.). **The manner of transmission of some Barley yellow-dwarf viruses by different aphid species.**—*Ann. appl. Biol.*, **48**, 4, pp. 711–720, 1960. [23 ref.]

In further studies at Rothamsted with virulent and avirulent isolates of barley yellow dwarf virus [**40**, 2, 298] obtained from cereal crops in Great Britain, only some were transmitted by *Rhopalosiphum padi*. *Sitobion fragariae*, *S. avenae*, and *Metopolophium dirhodum* transmitted viruses of both types, though usually transmitting those of which *R. padi* was a vector less readily than did *R. padi*. Transmissibility of a virus by a given aphid sp. was unaffected by transmission through a less efficient sp. *Neomyzus circumflexus* and *R. maidis* transmitted the few isolates with which they were tested.

A few *R. padi* individuals acquired virus in 30 min. feeding and they inoculated healthy cereal seedlings in 15 min. feeding, but the min. total time to acquire and transmit was 10 hr., and for about half the aphids 32 hr. were necessary. The dominant factor in transmission appeared to be the time taken to acquire virus, not that elapsing between acquisition and transmission. Nymphs of *R. padi* that moulted after leaving plants on which they had fed long enough to become infective transmitted virus to fewer plants than adults fed for the same periods.

Rochow (W. F.). **Comparison of four aphid species as transmitters of Barley yellow dwarf virus from Oat field samples in New York.**—*Plant Dis. Reptr*, **44**, 12, pp. 940–942, 1960.

At Dept Plant Path., Cornell Univ., Ithaca, evidence was obtained that *Macrosiphum granarium* [*M. avenae*] is the most important natural vector of BYDV [**40**, 219] in N.Y. In 4 consecutive yr. (1957–60) *M. avenae* transmitted the virus specifically from 81, 85, 84, and 86%, respectively, of 197 spring oat collections. Of 74 oat plants collected in 1960 the virus was recovered from 64 by *M. avenae* only; from 6 by *M. avenae* +1 or more of the other aphids tested; from 1 by both *Toxoptera graminum* and *Rhopalosiphum padi*; and from 1 by *R. maidis* only.

Murphy (H. C.). **Registration of Oat varieties, XXII.**—*Agron. J.*, **52**, 11, pp. 663–665, 1960.

In this further announcement [cf. **38**, 255] of 9 vars. is Moregrain (Reg. No. 165) from Coker's Pedigreed Seed Co., Hartsville, S. Carol., resistant to the important race groups 216 and 290 of crown rust [*Puccinia coronata*: **38**, 512; **39**, 568], which, respectively, attack Victoria and Landhafer. It is resistant to Victoria blight [*Cochliobolus victoriae*: cf. **39**, 302, 407] and moderately resistant to powdery mildew [*Erysiphe graminis*: cf. **37**, 36, 229], soil-borne mosaic [virus: cf. **38**, 256], and the yellowing which affected Victorgrain and other vars. in S.E. states in 1957–8 [cf. **38**, 201].

Macon (No. 168), developed by J. M. Poehlman at Mo. agric. Exp. Sta., Columbia, in co-operation with U.S. Dept Agric., has given higher yields than the vars. generally grown in Mo., except Mo. 0–205 in non-crown rust years. It possesses the A gene for resistance to races 1, 2, 3, 5, 7, 7A, and 12 of stem rust [*P. graminis*: cf. **38**, 736] and is highly resistant to loose [*Ustilago avenae*] and covered [*U. hordei*] smuts [cf. **38**, 255, 256].

Curt (No. 169) developed at Calif. Exp. Sta., Davis, also possesses the A gene and has the grain qualities of Kanota coupled with its tolerance of barley yellow dwarf [virus] and is higher-yielding.

Nehawka (No. 170) from Neb. agric. Exp. Sta. possesses protection from crown rust similar to that of Cherokee and Nemaha, the A genes, and high resistance to common races of the smuts, though susceptible to some new races, and is less susceptible to yellow dwarf.

Błaszczak (W.). **Wpływ zaprawiania ziarna, terminu siewu i innych zabiegów na występowanie głowni Owsa (Ustilago avenae Jens., Ustilago levis Kell. et Sw.) w latach 1955 i 1956.** [Influence of seed treatment, time of sowing, and other circumstances on the incidence of Oat smut (*U. avenae*, *U. hordei*) in the years 1955 and 1956.]—*Roczn. Nauk rol.*, Ser. A, **79**, 4, pp. 945–968, 1 graph, 1959. [Russ., Engl. summ.]

In tests of various treatments on inoculated seed of var. Przebój I [cf. **35**, 518] at the Agric. Coll., Poznań, Poland, the best results were obtained with ceresan dry [cf. **36**, 388] and the next best with agronal, fungitox OR [**40**, 162] (each at 300 g. 100 kg.), and 0·25% formalin for 15 min. Early sowing (27 Apr. and 4 May in 1955; 25 Apr. and 2 May in 1956) resulted in more smut than late (11 and 18 May; 9 and 16 May), and deeper sowing increased incidence.

Meshcheryakova (Mme R. I.). К методике учета пораженности Кукурузы пузырчатой головней. [On methods of assessing infection of Maize by blister smut.]—Бюлл. Укр. н.-и. Инст. Раст. Селек. Генет. [*Byull. Ukr. nauch.-issled. Inst. Rast. Selek. Genet.*], *1958*, 2, pp. 121–126, 1958.

The variations in [*Ustilago maydis*: **40**, 43, 166] infection between different maize vars. and selfing lines and within the same var. under different conditions were differences in size and position of blisters and in reaction to penetration, which resulted in varying degrees of damage on identical plant organs.

After surveying and rejecting as inadequate various methods proposed for assessing resistance to *U. maydis*, the author proposes a combined scale giving indexes for both plant resistance and quantitative assessment of infection. For individual plant organs a numerator indicates the type of resistance and the denominator (5 100) the percentage infection; the fraction thus indicates the seriousness of the disease on that organ and the total for all organs reflects the extent of the disease as a whole. Resistance indexes are: 0, no sign of resistance, the plant either dying or producing no seed; 1, large blisters, diam. 10 cm. and over, shiny, friable, containing many spores, with the major part of the organ infected; 2, similar blisters 5–10 cm., discrete; 3, blisters 2–3 cm., with chlorotic or necrotic haloes; 4, highest resistance, blisters < 1 cm., hard and dull, with few or no spores or pronounced haloes.

Meshcheryakova (Mme R. I.) & Shmagina (Mme M. A.). Поражаемость пузырчатой головней сортов и линий Кукурузы, полученных при различных формах опыления. [Susceptibility to blister smut in Maize varieties and lines obtained by different forms of pollination.]—Бюлл. Укр. н.-и. Инст. Раст. Селек. Генет. [*Byull. Ukr. nauch.-issled. Inst. Rast. Selek. Genet.*], *1958*, 2, pp. 77–80, 1958.

Infection by [*Ustilago maydis*: **39**, 304 and above] was higher in the F_1 when pollen

from the susceptible Chernaya krasavitsa was used on less susceptible vars. or on the resistant selfing line Khar'kovskaya belaya zubovidnaya. The participation of Chernaya krasavitsa as a pollen parent produced seed of different colours. Increase in susceptibility was noted both in plants raised from clearly hybrid seed and in those from white seed. Selection for hybridization must take into account the susceptibility of both components.

WISER (W. J.), KRAMER (H. H.), & ULLSTRUP (A. J.). **Evaluating inbred lines of Corn for resistance to Diplodia ear rot.**—*Agron. J.*, **52**, 11, pp. 624–626, 1 fig., 7 graphs, 1960.

After pointing out that no inbred or hybrid line of maize is completely resistant to *D. zeae* [*D. maydis*: cf. **37**, 717; **40**, 102 *et passim*] under conditions favouring infection, the authors describe a study at Purdue Univ., Lafayette, Ind., and Crops Res. Div., U.S.D.A., on methods of evaluating inbred lines for resistance. Inoculum was prepared from a mass isolate [cf. **29**, 83], the cultures being incubated at 70° F. with a 20-hr. photoperiod; when the plants had been in full silk for 1–2 weeks an aqueous spore suspension was sprayed over each ear with a compressed-air sprayer. Resistance was studied in the backcross progenies of 6 dent inbreds previously found to vary in susceptibility and, under the test conditions, it was shown by the ability to resist initial infection rather than by differences in the development of *D. maydis* at a later stage. Estimates of relative resistance of inbreds, based on the av. of all backcrosses with the same recurrent parent, gave good differentiation. Ill. 90 and R4, which had essentially similar reactions to ear rot as inbreds, displayed widely different abilities to transmit their own reaction.

HINGORANI (M. K.), GRANT (U. J.), & SINGH (N. H.). **Erwinia carotovora f.sp. zeae, a destructive pathogen of Maize of India.**—*Indian Phytopath.*, **12** (*1959*), 2, pp. 151–157, 3 fig., [1960].

Following the discovery in 1957 of bacterial stalk and ear rot [cf. **33**, 477] in maize crops on the Tarai State Farm, U.P., the disease was found in the States of Rajasthan, Andhra, Delhi, and Kashmir in all the principal growing areas. The pathogen produced soft rot in potato, carrot, and onion, and also infected jowar [*Sorghum*], bajra [*Pennisetum typhoides*], and tobacco. The disease is potentially serious.

QASEM (S. A.) & CHRISTENSEN (C. M.). **Influence of various factors on the deterioration of stored Corn by fungi.**—*Phytopathology*, **50**, 10, pp. 703–709, 2 fig., 1960.

In further studies at Univ. Minn., St. Paul [cf. **39**, 573], numerous brown, decayed embryos were found in good quality yellow dent corn inoculated with storage fungi (*Aspergillus* spp.) and kept at 14% moisture content and 30° C. for 2 yr.; germination was reduced to nil by 4 of the 5 spp. Moderate damage occurred after 2 yr. at 17–18% moisture and 10–15°. Germination of non-inoculated grain under these conditions was 88% and 96%, respectively, and no brown embryos were found.

VALDER (P. G.). **Diseases of Rice.**—*Agric. Gaz. N.S.W.*, **71**, 9, pp. 468–470, 1 fig., 1960.

The rice crop in N.S.W. is apparently free from fungus diseases. A few non-parasitic disorders which occur, including a purplish-brown discoloration of the glumes and leaves, may be mistaken for parasitic diseases. In N. Australia 4 major diseases, not generally serious, are present: *Helminthosporium oryzae* [*Cochliobolus miyabeanus*: **35**, 356], *Piricularia oryzae* [loc. cit.], root rot (*Fusarium* sp.), and leaf smut (*Entyloma oryzae*), and also a leaf and glume spot caused by *Curvularia* sp.

Clinton (P. K. S.). **Some pests and diseases of Sorghum, and their control in the Central Rainlands of the Sudan.**—*Emp. J. exp. Agric.*, **28**, 112, pp. 294–304, 1960.

The fungus diseases described here were recorded by the Central Rainlands Res. Sta., Sudan, on the crop at Tozi during 1952–56. The only serious malady was covered smut (*Sphacelotheca sorghi*) [cf. **36**, 752 *et passim*], which was severe, but completely controlled by seed dressings of organo-mercurials or thiram. Three cases of loose smut (*S. cruenta*) [loc. cit.] occurred in 1953, and on several occasions head smut (*S. reiliana*) appeared on isolated plants in local, private cultivations [loc. cit.]. Long smut (*Tolyposporium* sp.), present on wild *Sorghum purpureo-sericeum*, was not found on cultivated sorghum, but another unidentified *T.* sp. occurred on a few plants of an imported Japanese sorghum in 1955.

The leaf spot most frequently found was *Ramulispora sorghi* [loc. cit.]. This was severe only in 1953, when, with *Colletotrichum graminicola* [loc. cit.] it badly damaged S vars. normally grown under irrigation farther N. *Helminthosporium turcicum* was moderately widespread, but only once recorded as severe, and then on a few plants only. Most infected leaves bore spots of *Gloeocercospora sorghi*. Leaf spots appeared to be more severe where N fertilizers had been applied. *Sclerotium bataticola* [*Macrophomina phaseoli*] was found on the stems of some lodged plants. Observations, with data obtained from an experiment comparing thiram as a seed and as a soil dressing, indicated that even if *M. phaseoli* had been involved in lodging, it was not the main cause.

In a seed-dressing trial in 1954 aldrin and BHC (both at 1/1,000 w/w) were compared. Combined with the seed dressings was P_2O_5 fertilizer at 18 rotls/feddan, placed or broadcast before planting. With no treatment, only 6,700 plants emerged from 56,000 seeds/feddan, whereas aldrin gave 45,500 and BHC somewhat fewer; phosphate gave indecisive results. The vigour of the aldrin-treated plants was exceptional. In another trial sown in Sept. untreated seed gave 17,000 stand, BHC nearly twice as many, and thiram 9,000 more; with thiram + BHC the effect was smaller than with BHC alone, while the reduction when an organo-mercurial (1·50,000 w/w Hg) was combined with BHC reached the $P = 0{\cdot}05$ level.

Childs (J. F. L.) & Carpenter (J. B.). **Observations on stubborn and other diseases of Citrus in Morocco in 1959.**—*Plant Dis. Reptr*, **44**, 10, pp. 920–927, 4 fig., 1960. [20 ref.]

A detailed account is given of the history, symptoms, incidence and effects of stubborn disease, the principal disorder of citrus in Morocco [**36**, 184; Chapot, **40**, 168]. No evidence was obtained that stubborn symptoms resulted from any soil condition, though environmental factors inimical to the trees could accentuate the symptoms. Other causes of unhealthy trees were foot rot (*Phytophthora* spp.), greasy spot (*Mycosphaerella horii*) [cf. **39**, 172], and concentric canker (*Fomes applanatus*) [*Ganoderma applanatum*: cf. **33**, 25]. Virus diseases included the common occurrence of scaly bark (e.g. 21% infection with psorosis A in an orchard of 1,100 17-yr.-old Valencia) and, less commonly, the concave gum and blind pocket forms of psorosis [cf. **37**, 476]. Xyloporosis [map 374] was seen occasionally on Clementine, exocortis [291] on experimental Rangpur lime, and tristeza [289] on Meyer lemon, but not evident in commercial orchards. None of these is at present serious. Symptoms of Zn deficiency [**40**, 222] were observed in most districts.

Grant (T. J.) & Corbett (M. K.). **Mechanical transmission of the infectious variegation virus of Citrus.**—*Nature, Lond.*, **188**, 4749, pp. 519–520, 1 fig., 1960.

Inoculum of citrus infectious variegation virus [**40**, 46] was prepared, in joint studies by the U.S. Dept Agric., Orlando, and Univ. Gainesville, Fla, from the leaves of Eureka lemon with typical symptoms (vein or veinlet banding, speckle,

blotch, and crinkle), frozen to −10 to −20° C. with 1 ml. 20% sucrose/g. leaf material + activated charcoal, then thawed and macerated, and the juice expressed through cheese-cloth. Leaves of 2- to 4-leaf or 12–14 in. high citrus seedlings were dusted (Jan.–Mar.) with 500-mesh 'carborundum', rubbed with a gauze or a nylon bristle brush dipped in the inoculum, and rinsed with tap water immediately. All the young Eureka lemon and sour orange plants so inoculated became infected and some of the older ones. Some Eureka lemons developed systemic symptoms identical with those on the source plant 15–25 days after inoculation and sour orange seedlings displayed vein banding and later chlorotic blotches on young leaves, and leaf crinkle and cupping. The virus was recovered from the young systemically infected and from inoculated leaves by piece-grafting, but was transmissible mechanically only from the former.

Carpenter (J. B.) & Furr (J. R.). **Wood pitting of undetermined cause in unbudded Citrus seedlings.**—*Plant Dis. Reptr*, **44**, 12, pp. 916–918, 1 fig., 1960.

Wood pitting which might be confused with that caused by virus infection [cf. **37**, 166] was found in hybrid and nucellar seedlings of mandarins, tangelos, tangors, oranges, shaddocks, and grapefruit in the seedling collection at U.S.D.A. Irrigation Field Sta., Brawley, Calif. and in nucellar seedlings of Palestine sweet lime at Indio. The consequent desirability, therefore, of setting aside control lots of stock seedlings used in stock-scion virus disease experiments for observation, of indexing all seedlings, and of replacing Palestine as an indicator are discussed.

Chorin (Mathilda). **Grapefruit branches affected by galls associated with Phomopsis sp.**—*Ktavim* (now *Quart. J. nat. Univ. Inst. Agric.*), **10**, 2, pp. 97–98, 2 fig., 1960.

P. ? *citri* was isolated from galls on grapefruit branches (and once from a Shamouti orange branch) from Israel and from similar material from Cyprus. The galls appear on both young and old branches and are at first greenish-brown, 2–10 mm. long × 2–25 mm. wide, turning dark brown and coalescing into larger galls 2–10 cm. diam. A brown callus plate develops over the galls, extending round the affected branch. Inoculation studies are in progress.

Klotz (L. J.), DeWolfe (T. A.), Roistacher (C. N.), Nauer (E. M.), & Carpenter (J. B.). **Heat treatments to destroy fungi in infected seeds and seedlings of Citrus.**—*Plant Dis. Reptr*, **44**, 11, pp. 858–861, 1960.

This information from Riverside and Indio, Calif., has been noticed [**40**, 306]. When heat-treated seeds were treated with thiram dust or 3 min. in 1% 8-hydroxyquinoline sulphate to inhibit growth of air-borne moulds, germinability remained unaffected after 2–35 days storage at 40–45° F.

Grierson (W.), Hayward (F. W.), & Oberbacher (M. F.). **Simulated packing, shipping, and marketing experiments with Valencia Oranges.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 248–253, 1 fig., 2 diag., 1960. [23 ref.]

In further tests at Lake Alfred Citrus Exp. Sta. [**40**, 106] excellent control of [unspecified] decay of Valencia oranges in shipping tests was given by diphenyl pads with either dowicooled (0·1% Na *o*-phenyl-phenate at pH 10·5 in the hydrocooler) or warm-packed fruit and rapid air pre-cooling (with refrigerated air)+ dow-hex. With dowicooling alone control was excellent until the oranges were transferred to 70° F. when a rapid increase in decay occurred.

Wallihan (E. F.) & Embleton (T. W.). **Iron chlorosis.**—*Calif. Citrogr.*, **46**, 3, pp. 67, 87, 89, 1960.

At Univ. Calif. Citrus Exp. Sta. a saturated solution of chel 138 H Fe [cf. **34**, 365;

37, 478] at 1 lb. tree in 2½ gal. water applied with a weed gun alleviated iron chlorosis symptoms [cf. **40**, 87] in citrus within 3 months, but this response, though secured in another experiment, was not consistently obtained in all repetitions.

An investigation of citrus tree roots in Ventura and Orange counties revealed the unexpected fact that more new roots were produced in winter than in summer, while a greenhouse experiment showed that low O conc. in the soil may lead to iron chlorosis, the complete explanation of which and a reliable control have still to be found.

LEONARD (C. D.) & STEWART (I.). **Soil application of manganese for Citrus.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 38–45, 1960.

In field trials at Citrus Exp. Sta., Lake Alfred, applications of 5 lb. $MnSO_4$ +3 lb. $CaCl_2$ to Mn deficient trees [**34**, 718] on acid soils corrected the deficiency in 5 months, while without $CaCl_2$ 8–11 months were required. On calcareous soils Mn deficiency was remedied by 5 lb. $MnSO_4$ + 5 lb. $CaCl_2$ with or without 5–10 lb. wettable S per tree.

THOMPSON (W. L.). **Leaf drop following spray applications on Citrus.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 29–34, 2 graphs, 1960.

At Fla Citrus Exp. Sta., Lake Alfred [**40**, 305], the application of basic $CuSO_4$ or Cu oxide—2 gal. lime-S 100 gal. caused greater leaf drop from grapefruit trees than lime-S alone. Leaf drop was not affected by zineb, basic $CuSO_4$, or lead arsenate applied singly or in 1·3% oil.

LENZI (ANNA M.). **Suberosi di foglie di Agrumi.** [Corkiness of Citrus leaves.]—*Boll. Staz. Pat., veg. Roma*, Ser. 3, **17** (*1959*), 2, pp. 169–181, 9 fig., 1960. [Engl. summ. 19 ref.]

This condition (fully described) affected the leaves of orange and mandarin trees near Fondi (province of Latina), Italy: irregular, more or less raised, mostly confluent, brown pustules developed on the upper and lower surface. It is thought that the trouble is probably due to environmental factors.

NUTMAN (F. J.) & ROBERTS (F[LORENCE] M.). **Investigations on a disease of Coffea arabica caused by a form of Colletotrichum coffeanum Noack. II. Some factors affecting germination and infection, and their relation to disease distribution.**—*Trans. Brit. mycol. Soc.*, **43**, 4, pp. 643–659, 13 graphs, 1960.

In germination and temp. reaction studies at the Coffee Berry Disease Res. Unit, Kenya [cf. **40**, 170], with techniques and methods of computation which are described, the opt. temp. for germination of conidia of *C. coffeanum* [*Glomerella cingulata*] under poor nutritional conditions was 22° C., with a slight rise as nutrition improved. Germination and infection of green coffee berries were possible between 17–28°. As the required high R.H. and suitable temps. rarely occur together in the field and seldom for long enough to allow successive infection, it is concluded that liquid water (rain or heavy mist) is necessary for infection in the field. Desiccation studies indicated that 3–4 days of rainless weather would reduce the infectivity of extruded conidia to a very low level. Under laboratory desiccation recurrence of suitable conditions after a min. of 20 hr. drying made renewed germination possible, but with greatly reduced infectivity.

The disease is seldom serious below 5,500 ft. The inter-relationships between topography, climate, and eco-climate [cf. **32**, 78], discussed in detail with regard to the data from 3 coffee-growing areas, indicate that the correlation between disease occurrence and such factors is close enough to enable prediction of probable disease occurrence in a given area.

Shade, incurring longer periods of suitable temp. at lower altitudes, prolongs

suitable invasion time, whereas at higher altitudes it reduces the favourable temp. period; it also modifies humidity conditions.

Waddle (B. A.). **Registration of improved Cotton varieties.**—*Agron. J.*, **52**, 11, p. 658, 1960.

Dixie King (Reg. No. 40) carries the same genetic factors for resistance to *Fusarium* wilt [*F. oxysporum* f. *vasinfectum*] as its parents, Empire and Coker 100 W. In Austin (No. 41) the B_7 gene confers immunity from *Xanthomonas malvacearum* race 1 and tolerance of race 2, the tolerance of *F. oxysporum* f. *vasinfectum* in Empire being retained.

Plant pathology.—*Progr. Rep. Exp. Stas. Emp. Cott. Gr. Corp. (Uganda). 1959–60*, pp. 28–32, 1960.

An account of bacterial blight of cotton by C. Logan reports that several phages of *X. malvacearum* [**40**, 224], markedly strain-specific, were isolated from soils and cotton trash by the method of Crosse & Hingorani [**37**, 291]. In a study of the effects of the phages on primary infection seed was immersed for 1 hr. in a dilute liquid nutrient containing $2{\cdot}8 \times 10^9$ active phage particles ml. and air was intermittently evacuated for the 1st $\frac{1}{2}$-hour. This treatment halved the incidence of primary infection. Spraying the phage (same conc.) on to the soil above untreated seed or on to the upper and lower surfaces of the cotyledons of 9-day-old seedlings had no effect. The results suggest that while the phage reduced the inoculum potential of the bacterium on the seed coat it had no effect on the subsequent development of the disease.

Information on *Fusarium* wilt (*F. oxysporum* f. *vasinfectum*) and root-knot diseases of cotton has mostly been noticed [cf. **39**, 580]: D. A. Perry states that for a root inoculation technique, used to enable rapid assessment of the comparative susceptibilities of cotton vars. in the glasshouse, a standard vol. of a culture of the fungus in liquid Czapek Dox was applied to the roots of 6-day-old plants in polythene bags containing soil. Wilt symptoms appeared on the cotyledons 6–8 days later and within 14 days all the plants of a susceptible var. had become affected.

Tarr (S. A. J.). **Seed treatment against blackarm disease of Cotton in the Sudan. V. Results with seed carrying light and moderate infection.**—*Emp. Cott. Gr. Rev.*, **38**, 1, pp. 30–35, 1961.

In further work [cf. **36**, 244; **40**, 308] in 1954–56 the short-wet treatment of 7 samples of very lightly to moderately infected seed with MEMA gave better control of *Xanthomonas malvacearum* than mercuric chloride-iodide powder (abavit). It reduced the amount of disease in the mature crop, increased the yield of seed cotton by 0·7 kantars (1 kantar = 312 lb.) feddan (1·038 acre), improved emergence, and made the crop slightly earlier. A residual seed-borne infection of 0·017% (about 17 infected seedlings/acre), which survived the treatment, caused a crop loss of about 0·7 k./f. Such residual infection can lead to considerable crop loss later on, as the Gezira is an area favourable for spread and the locally grown vars. are very susceptible.

Innes (N. L.) & Last (F. T.). **Cotton disease symptoms caused by different concentrations of Xanthomonas malvacearum.**—*Emp. Cott. Gr. Rev.*, **38**, 1, pp. 27–29, 1961.

The concs. of bacteria used [cf. **39**, 229] were $2–3 \times 10^6$ ml. and $2–3 \times 10^2$ in 1958–9 (inoculum from cultures) and $2–3 \times 10^6$ and $2–3 \times 10^4$ in 1959–60 (from cotton leaf trash). Sprayed on to American Upland and 'S' and 'L' types of Egyptian cotton with different combinations of resistance factors at Shambat, Sudan, in 1958–9, the inoculum decreased in conc. by a factor of 10,000 decreased the mean

level of infection by 2 grades (Knight and Clouston's scale) [cf. **18**. 796], but the extent of the effect differed significantly with the var. In 1959–60 decreasing the conc. by a factor of 1:100 reduced severity of attack by an av. of 1 grade.

Increasing concs. of inoculum increased the size and severity of individual lesions. Resistance may be lowered by the more numerous infections, or lesion size may be directly related to the numbers of bacteria in each infection site.

Maier (C. R.) & Stauffeldt (E. E.). **Cultural variability of selected isolates of Rhizoctonia solani and Thielaviopsis basicola, and the variability in their pathogenicity to Acala and Pima Cotton, respectively.** *Plant Dis. Reptr.*, **44**, 12, pp. 956–961, 1 fig., 1960.

In further studies at N. Mex. agric. Exp. Sta., Univ. Park, the results of which are fully tabulated, 12 isolates of *R.* [*Corticium*] *solani* [**39**. 173; **40**. 308] yielded 6 different cultural types and 4 distinct pathogenic strs. Variation in *T. basicola* [**38**. 693] was less than in *C. solani* but of 11 isolates 6 distinct reactions based on cultural and pathogenic characteristics were determined in greenhouse tests.

Bazán de Segura (C.), Herrera (J. H.), Robles (F.), & Velarde (G.). **Control de la chupadera fungosa del Algodonero—1959.** [Control of fungal damping-off of Cotton—1959.]—*Bol. tec. Soc. nac. agrar. Lima* 11, pp. 1–13, 1960.

In field experiments in Peru on the control of *Rhizoctonia* [*Corticium*] *solani* [**38**, 84], seed treatments with 75% quintozene or 10% rhizoctol markedly increased the number of surviving plants. A rate of 230 g. q. is recommended. No fungicide produced any marked improvement in germination.

Лен-долгунец. [Long staple Flax.]—576 pp., illus., Moscow, Sel'khozgiz, 1957. Roubles 9.45.

Mme T. T. Popova contributes to chapt. 11 (pp. 301–368) sections on 'diseases of flax' and 'a system of controls for diseases and pests of flax'. The most destructive pathogen is *Fusarium lini* [map 32], occurring in many regions of the Soviet Union. Others mentioned are *Polyspora lini* [88 and below], especially serious since 1946 in almost all flax areas, and *Colletotrichum lini* [*C. linicola*: 159 and below]. Each pathogen is discussed in some detail.

Осиев (I. M.) & Бушев (V. E.). Опыты заблаговременного протравливания семян льна. [Experiments on a timely treatment of Flax seed.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 12, p. 29, 1960.

At Mogilev entomol. Div., U.S.S.R., applications of granosan, mercuran (both 1·5 g./kg. seed), and thiram (3 g./kg.) reduced the incidence on flax stalks of anthracnose [*Colletotrichum linicola*: **39**. 281 and above] from 25·8% to 14·5–23, polysporiosis [*Polyspora lini*: **39**. 108 and above] from 8·9 to 1·6–7·1, rust [*Melampsora lini*: **37**. 400] from 10·3 to 3·8, ascochytosis [*Ascochyta linicola*] from 3 to 1·2–1, saprophytic fungi (*Alternaria* [spp.]) by 10·5%, fusariosis [*Fusarium lini*: cf. above] by 0·35, bacteriosis [*Pseudomonas fluorescens*] by 5–8, and other pathogens by 3%. Treatment, which was more effective 3 months before than immediately before sowing, affected growth and yields favourably: for instance, following mercuran there were 91·9% normal stalks (77 in the control), yields of 1,250 kg. seed/ha. (900), and 5,400 kg. straw/ha. (4,410).

Heursel (J.). **Invloed van te natte bodem op de schimmelflora van het wortelstelsal van enkele potplanten.** [Influence of unduly damp soil on the fungus flora of the root system of some pot plants.]—*Verh. Rijkssta. PlZiekt. Gent* 7, 28 pp., 1960. [Fr., Engl., Germ. summ. Cyclostyled.]

The plants studied were *Tradescantia virginica*, *T. blossfeldiana*, *Coleus* sp., *Iresina*

herbstii, and *Hydrangea opuloides* grown under normal conditions or with the pots standing in 1·5 cm. water in compost composed exclusively of oak leaves and the same inoculated with *Fusarium oxysporum* from *Aechmea fasciata* or with *Cylindrocarpon radicicola*. The most abundant fungus population (consisting mainly of the 2 inoculated spp. and *Trichoderma viride*) occurred in the normally cultivated plants. Numbers were significantly lower in the bottoms of pots standing in water than in other parts.

Reckendorfer (P.). **Die Viruschlorose in ihren Beziehungen zum Eisen. Das Enzymprotein. Modellversuch mit Abutilon striatum.** [Virus chlorosis in relation to Fe. The enzyme protein. Initial experiment with *A. striatum*.]—*PflSchBer.*, **24**, 5–7, pp. 73–81, 1960. [Engl. summ.]

Spraying *A. striatum* plants infected by abutilon infectious variegation virus [**39**, 683] with Fe chelate at the Chemisches Laboratorium, Bundesanstalt für Pflanzenschutz, Vienna [cf. **37**, 142], produced no change in the symptom picture as a whole and did not cause the yellowed parts of the leaves to turn green. It is assumed that the virus chlorosis is caused by changes leading to the denaturation of enzyme protein with all its biological consequences, including retrogression of chlorophyll synthesis.

Aragaki (M.) & Ishii (M.). **A spadix rot of Anthurium in Hawaii.**—*Plant Dis. Reptr*, **44**, 11, pp. 865–867, 1 fig., 1960.

During autumn, 1959, *A. andraeanum* growing in the high rainfall areas of Hawaii suffered an epiphytotic of spadix rot caused by *Colletotrichum gloeosporioides* [*Glomerella cingulata*: cf. **25**, 382; **37**, 25]. The rot developed rapidly with the prevailing high temp. and high R.H. and on plants in transit, but was controlled by maneb (2 lb./100 gal.), dodine, and dyrene (both 1 lb.). Plunging in a hot-water bath at 46°–48° C. for 15 and 30 min. followed by a cold wash also gave good control on inoculated spadices [cf. **32**, 684]. An isolate from papaw was pathogenic on the spadix.

Gill (D. W.). **A stem and branch rot of Snapdragon.**—*Plant Dis. Reptr*, **44**, 12, pp. 946–947, 1960.

Phytophthora parasitica was isolated from diseased antirrhinums [cf. **10**, 761; **38**, 481] in a commercial greenhouse in Ga in 1958, a new host record for the U.S.A.

Semal (J.). **Étude de quelques isolements effectués à partir de 'Begonia tuberhybrida'.** [A study of some isolations made from *B. tuberhybrida*.]—*Bull. Inst. agron. Gembloux*, **28**, 2, pp. 199–216, 2 pl. (16 fig.), 1960. [23 ref.]

All multiflora vars. of *B. tuberhybrida* growing near Ghent [cf. **38**, 261] in 1958–9 and propagated from tubers for many yr. were shown at the Inst. Agron., Gembloux, Belgium, to include a high percentage of virus-affected plants, the varied symptoms on which are described. Symptoms (also described) on grandiflora *B. tuberhybrida* plants, less affected, were more homogeneous.

Grandiflora plants grown from seedlings and infected in the field (primary infection) were usually stunted and had 'leprous' leaves; they became easily distinguishable in Sept.–Oct. On seed-producers grown from tubers secondary symptoms were usually less marked.

The symptoms produced by 7 isolates of virus from affected multiflora plants on inoculation to numerous hosts (mechanically and with *Myzus persicae*) are described, with studies on the characteristics of the isolates.

It is concluded that isolates 1 and 2 were typical cucumber mosaic virus (CMV), 3–7 produced necrotic and chlorotic 'ring spot' symptoms on many host plants, notably on tobacco, while grandiflora begonias inoculated in the greenhouse with

isolates 3, 5, and 7 developed symptoms resembling those on plants of the same vars. infected naturally. Isolate 3 did not impart immunity from the yellow variant of CMV in tobacco plants [cf. **38**, 495], but did do so in *Zinnia elegans*; all the isolates reacted positively in gel diffusion tests with tomato aspermy virus antiserum, and are therefore referred to the cucumber mosaic group. As, however, the symptoms produced on various hosts are not typical of CMV, possibly it is mixed with another virus, the identity of which has not been established. Inoculations of *B. tuberhybrida* with some isolates, especially one from cucumber, gave rise to symptoms resembling those described for tomato spotted wilt virus.

Saksena (H. K.). **Petiole rot of Caladium bicolor Vent. caused by a new strain of Pellicularia filamentosa.** *Indian Phytopath.*, **12** (*1959*), 2, pp. 144–150, 3 fig., [1960].

During hot, wet weather in 1956 and 1957 *C. bicolor* plants growing in the bot. Gdns., Kanpur, were affected by brown, watersoaked lesions on the thin margins of the basal part of the petiole near soil level, sometimes causing premature death of the leaves. Diseased tissues yielded *P. filamentosa* [*Corticium solani*] which was shown to belong to a new str. specifically pathogenic to the Araceae.

Pesante (A.). **La fialoforosi del Garofano nella Riviera dei Fiori (Liguria Occidentale).** [Phialophorosis of Carnation on the Riviera dei Fiori (Western Liguria).] —*Boll. Lab. sper. Fitop. Torino*, **21**, N.S., 2, pp. 85–109, 4 fig., 1958. [Engl. summ., 26 ref.]

Chiefly a review, from Univ. Turin, Italy, of all aspects of carnation wilt (*Verticillium cinerescens*) [**40**, 226], which is widespread in the area.

When vapam (followed by an equal amount of water) was applied to plots (3 sq. m.) at 1·5 kg. 100 l. water 10 sq. m., no disease appeared, though many plants became affected in the untreated plots. When, however, larger plots (100–150 sq. m.) were treated at 0·2–1 kg. 100 l. 10 sq. m. the results were less encouraging. In sandy soils 0·5 kg. gave satisfactory control and 1 kg. prevented almost all the plants from becoming infected, but in clay soils 0·5 kg. was ineffective and 0·8–1 kg. gave little or no benefit.

Munnecke (D. E.). **Bacterial stem rot of Dieffenbachia.** *Phytopathology*, **50**, 10, pp. 696–700, 2 fig., 1 graph, 1960.

During 1956 greenhouse plants of *D. picta*, *D. picta* 'Rudolph Roers', *D.* × *bausei*, and *D. amoena* near Los Angeles, Calif., wilted, then developed a soft rot at soil level or associated with cutting wounds, and collapsed in 2–3 weeks. Internal brown streaking spread inwardly and vertically. Bacteria abundant in vessels, xylem parenchyma, and resin duct canals were identified as *Erwinia chrysanthemi* str. [cf. **40**, 150] and shown to be pathogenic. Partial control may be achieved by dipping cuttings in agrimycin 100 and propagating in a disinfected greenhouse; any remaining bacteria are eradicated by treating the canes 1–1½ in. diam. in water at 120° F. for ½–1 hr.

Schwinn (J.). **Phytophthora cactorum (Leb. et Cohn) Schroet. als Erreger einer Stengelfäule an Pelargonium-Arten.** [*Phytophthora cactorum* as the agent of stem rot of *Pelargonium* spp.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, **12**, 11, pp. 168–170, 6 fig., 1 graph, 1960.

A report from Univ. Bonn, Germany, of infection in a Bonn greenhouse on *P. radula* and *P. tomentosum*, these being new host records [**39**, 667]. The fungus was isolated from the soil round the plants as well as from the diseased tissues. Culture filtrates caused a specific wilt in *P.* shoots attributed to a toxin, isolation and identification of which is being attempted [cf. **21**, 104].

Pustovoĭt (V. S.). Методы выведения сортов Подсолнечника, иммунных к основным болезням и вредителям. [Methods for breeding Sunflower vars. immune from common diseases and pests.]—*J. agric. Sci., Moscow*, **5**, 10, pp. 26–38, 6 fig., 1960. [Fr., Engl., Germ. summ.]

Crosses with wild Texas sunflower produced some biotypes with resistance to rust [*Puccinia helianthi*: **39**, 472]; these were crossed with VNIIMK 3519 and then with the broom-rape (*Orobanche*) resistant vars. VNIIMK 1646, 6540, and 8931. Selection in subsequent generations and repeated crosses with the best VNIIMK vars. produced cultivated forms with high resistance to *P. helianthi*. Of 80 interspecific hybrids examined in 1956, 26, including nos. 19484 and 19499, were completely resistant and no. 19452 had only 5% infection, whereas VNIIMK 8931 had 100%. The 3 resistant lines were considerably better than the local var. in seed and oil yield. From 1950 onwards false mildew [*Plasmopara halstedii*: **39**, 320 and below] became increasingly serious in the Krasnodar area, and attempts were made at crossing sunflower with artichoke to produce a sunflower var. with complex resistance to pests and diseases. In 1960 four F_4 interspecific hybrids were produced with complete resistance to *P. halstedii*, as against an av. of 51·7% infection in the sunflower (8931) parent.

Novotel'nova (Mme N. S.). Биологические особенности **Plasmopara halstedii (Farlow) Berl. et de Toni** на Подсолнечнике. [Biological properties of *P. halstedii* on Sunflower.]—*Bot. Zh. S.S.S.R.*, **45**, 9, pp. 1283–1300, 2 pl., 8 fig., 1 map, 1960. [Engl. summ. 1 p. ref.]

A study by All-Union sci.-Res. Inst. Plant Prot., Leningrad, U.S.S.R., showed that there exist a sub-lethal form, a dwarf form (both derived from diffuse infection), and a local form (from local infection) of the disease [**40**, 112]. Zoosporangia germinated mostly at 9–22° C. (extreme limits 5 and 28°), opt. 16–18°. The account of geographical distribution includes, in addition to the recorded areas [map 286], Calif. and Ore., parts of Germany (F. Schicht, *Deutsch. Landw.* 6, 1955) and Czechoslovakia (V. Bojňanský, *Polnohospod., Bratislava*, **3**, 3, 1956), and (in the U.S.S.R.) the Stavropol' region, N. Ossetia, Kabardino-Balkar, and Checheno-Ingush [cf. **39**, 587 and above].

Lukashevich (A. I.). Очистка семян Подсолнечника от склероциев белой гнили. [Cleaning Sunflower seeds from the sclerotia of white rot.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 12, pp. 34–35, 3 fig., 1960.

The technique used by Kirovograd agric. exp. Sta., U.S.S.R., is based on the difference in sp. gr. of sunflower seed (lighter than water) and sclerotia of *Sclerotinia libertiana* [*S. sclerotiorum*: cf. **38**, 212] (1·1–1·2). In a bath at 35–40° [C.] the air held by the sclerotia escapes and they sink. The operation takes 5–8 min. and provides 95–98% clean seed. Improvements included a stirring mechanism and a double container to separate the sclerotia from the inner, which can be moved, to the outer.

Braverman (S. W.). **The Helminthosporium gramineum complex and related species on cereals and forage grasses.**—*Phytopathology*, **50**, 10, pp. 688–691, 1960.

Further details are given from the U.S. Regional Pasture Res. Lab., Univ. Park, Pa., of 5 *H.* spp. [cf. **38**, 9] compared morphologically, physiologically, and pathologically. Spores in culture were smaller and more uniform than those produced either naturally or by inoculation on the hosts. *H.* [*Pyrenophora*] *bromi* had the largest conidia; *Pleospora phaeocomes* grew only poorly in media with 8 different N sources; *H.* [*Pyrenophora*] *teres* grew better than the other spp. in a KNO_3 medium; while *H. gramineum* grew poorly but significantly better than *Pleospora*

phaeocomes on all media. *P. bromi* and *P. phaeocomes* produced no pigment in culture [loc. cit.]. *Pyrenophora avenae* is distinguished by the pigment it produces and its ability to grow on a variety of media on which the other spp. do not.

Braverman (S. W.) & Graham (J. H.). **Helminthosporium dictyoides and related species on forage grasses.**—*Phytopathology*, **50**, 10, pp. 691–695, 4 fig., 1960.

Further details are given [cf. above] of the 2 physiologic forms of *H. dictyoides* [**38**, 10]. Conidia of all the isolates were morphologically identical but growth was variously inhibited by 2 concs. of malachite green and crystal violet. *H.d.* f.sp. *dictyoides* from *Festuca elatior* and *F. arundinacea* produced sclerotia-like bodies on potato dextrose agar, and chloroform extracts of this form and of *H.d.* var. *phlei* from *Phleum pratense* were beige to yellow, while f.sp. *perenne* from *Lolium multiflorum*, *L. perenne*, and *L. perenne* × *F. elatior* did not produce sclerotia and there was no visible pigment.

Bancroft (J. B.), Tuite (J.), & Hissong (G.). **Properties of White Clover mosaic virus from Indiana.**—*Phytopathology*, **50**, 10, pp. 711–717, 10 fig., 4 graphs, 1960. [16 ref.]

At Purdue agric. Exp. Sta., Lafayette, Ind., this isolate [**40**, 173] was mechanically transmissible to 26 spp. in 5 fam. The dilution end-point was above 1×10^{-6}, and longevity *in vitro* 10 min. at 75° C. and 2 weeks at 20°. The virus particle is a rod 477×15 mμ.

Krczal (H.). **Eine vom Weißklee auf Fragaria vesca (L.) übertragbare Virose.** [A virosis transmissible from White Clover to *Fragaria vesca*.]—*Z. PflKrankh.*, **67**, 10, pp. 599–602, 3 fig., 1960. [Engl. summ.]

The virus from white clover plants affected by greening and phyllody of the flowers was transmitted through *Cuscuta arvensis* to *F. vesca* at the Inst. für Obstkrankheiten, Heidelberg, Germany. The symptoms suggest that the virus is identical with strawberry green petal virus [**37**, 243; cf. **39**, 604; **40**, 234], not hitherto known in Germany.

Nüesch (B.). **Untersuchungen an Rotklee-Populationen im Hinblick auf die züchterische Verbesserung des Mattenklees.** [Studies of Red Clover populations in relationship to improvements in the breeding of meadow Clover.]—*Landw. Jb. Schweiz*, (**74**, éd. fr. **61**), N.F. **9**, 4, pp. 303–407, 1960. [Fr., Engl. summ.]

Resistance to *Sclerotinia trifoliorum* [**40**, 229] and a brief consideration of several other virus and fungus diseases are included in chapt. 9 (sections C–D, pp. 365–68) of this study from the Eidgenössische landwirtschaftliche Versuchsanstalt Zürich-Oerlikon, and the Inst. für Pflanzenbau ETH. Inoculation tests with *S. trifoliorum*, using Frandsen's method [**40**, 113] on 9 foreign vars. and 8 wild native populations during 1955–58, gave significant differences. Among 6 meadow and 6 wild clover populations there were 20·8 and 14·1% surviving plants, respectively. The progeny of meadow plants surviving inoculation showed a higher resistance to further infection than the original population.

Cappellini (R. A.). **Field inoculations of forage legumes and temperature studies with isolates of Sclerotinia trifoliorum and Sclerotinia sclerotiorum.**—*Plant Dis. Reptr*, **44**, 11, pp. 862–864, 1960.

At the Dept Plant Path., Rutgers Univ., New Brunswick, N.J., isolates of *S. sclerotiorum* obtained from lettuce, tomato, peony, and *Draba* sp. infected only Ladino clover, while isolates of *S. trifoliorum* from lucerne, red clover, and vetch infected 4 lucerne vars., red clover, and Ladino clover in field inoculation. Isolates of *S. sclerotiorum* grew best at 20–25° C., and those of *S. trifoliorum* at 15–20° [cf. **35**, 45].

Thind (K. S.) & Sharma (S. R.). **Physoderma on Trifolium alexandrinum Linn.**—*Indian Phytopath.*, **12** (*1959*), 2, pp. 122–130, 18 fig., [1960].

Crops of *T. alexandrinum* (berseem) growing in waterlogged soil in 1957 and 1958 at Khalsa College Farms, Univ. Punjab, Amritsar, were affected by large numbers of galls, occurring on the lower parts of the stems, at first coloured like the stem, later brown and dry, while the rest of the plant was unaffected. This is the 1st record of a *P.* on this host; the sp. appears to be near *P. alfalfae* [map 130], but differs in not causing stunting and malformation and in some minor morphological features. Development is described in detail.

Colotelo (N.) & Ward (E. W. B.). **β-Glycosidase activity and cyanogenesis in the susceptibility of Alfalfa to winter crown rot.**—*Nature, Lond.*, **189**, 4760, pp. 242–243, 1 graph, 1961.

In further studies at Edmonton, Alta, HCN was released by the basidiomycete associated with crown rot [**38**, 754] in cultures on lucerne filtrate but not on *Medicago falcata* filtrate. It is suggested that the production of HCN in the field is due to β-glycosidase activity of the fungus on cyanogenic host substrates. *M. falcata* is fairly resistant to winter crown rot.

Toole (E. R.) & Lightle (P. C.). **Status of Persimmon wilt, 1959.**—*Plant Dis. Reptr*, **44**, 1, p. 45, 1 fig., 1960.

A summary of the distribution of and damage caused by *Cephalosporium diospyri* [**29**, 518] on the American persimmon, which is a pernicious invader of pasture in the U.S.A., and the 1st record of its presence in Okla. In some areas the pest has been eradicated by the fungus.

Cation (D.) & Carlson (R. F.). **Determination of virus entities in an Apple scion/rootstock test orchard.**—*Quart. Bull. Mich. agric. Exp. Sta.*, **43**, 2, pp. 435–443, 2 fig., 1960.

Approximately 56% of 215 apple trees, indexed on R 1 2740-7 A, harboured the chlorotic leaf spot syndrome [**40**, 175]. Stem pitting [**40**, 313] appeared to be caused by a virus distinct from chlorotic leaf spot and was found only on Virginia Crab, Delcon, 0–524, Alnarp 2, and Golden Delicious combinations. One Winesap tree produced rubbery wood symptoms on Lord Lambourne.

Kaul (T. N.). **Occurrence of perfect stage of Apple scab pathogen in India.**—*Curr. Sci.*, **29**, 11, p. 445, 1960.

A brief description is given of perithecial *Venturia inaequalis* 1st collected in Kashmir, India, in Apr. 1960, on overwintered apple leaves [map 120: **15**, 29].

Casarini (B.), Ercolani (G. L.), & Govi (G.). **Influenza degli anticrittogamici sulla fioritura del Melo.** [The effect of fungicides on the flowering of Apple.]—*Progr. agric.*, **6**, 10, pp. 1177–1187, 2 pl. (1 col.), 10 fig., 1960.

Stark Delicious, Starking, and Golden Delicious apples growing, respectively, at Galliera, Molinella, and Ora in the province of Bologna, Italy, were sprayed by the authors (Univ. Bologna) against scab [*Venturia inaequalis*] (same number of applications to all trees in any locality) in 1959, when infection was slight, with 15% phenyl-mercury acetate (0·15%), SR 406 (0·25%), Caffaro powder (0·37%), veravit (Cu tetrachloride, 0·3%), pomarsol forte (0·25%), tiezene (0·25%), and pomarsol Z forte (0·25%). In spring 1960 all the trees received 3 applications of tiezene before flowering, and the number of flowers on each was counted. On all vars. there was greater flower production following the dithiocarbamates and SR 406 than on trees sprayed with Cu oxychloride or phenyl-mercury acetate, in spite of the fact that the former groups had given a greater yield in 1959 than

the latter groups. Again, on the former groups the amount of flowering was inversely proportional to the previous year's yield; broadly speaking, tiezene and SR 406 increased yields in the year of application, whereas pomarsol forte and Z forte gave increased flowering a year later.

The yields following Cu and Hg products were small in the year of application and there was little flower production the next year, especially on Golden Delicious given Cu and on Stark Delicious and Starking given Hg.

The best crops followed the dithiocarbamates (especially tiezene) and SR 406 in the year of application, with satisfactory flower production a year later.

Moore (M. H.), Kirby (A. H. M.), & Bennett (Margery). **A comparison of lime-sulphur with an organic-fungicide alternative in the Apple spray programme.** – *J. hort. Sci.*, **36**, 1, pp. 18–27, 1961.

At E. Malling Res. Sta. high-vol. sprays of dinocap (karathane, 0·05 or 0·025%) alone or + commercial 50W captan (0·05%) were compared with standard lime-sulphur (2% v v pre-blossom and 1% v v post-blossom) on dwarf-pyramid apple trees of 4 vars. on M. VII for 3 consecutive seasons, 1954–56 [**38**, 607]. The details of control of scab (*Venturia inaequalis*) and mildew (*Podosphaera leucotricha*) and extent of spray damage estimated both as fruit russeting and loss of crop are fully tabulated. On Cox's Orange Pippin and Newton Wonder karathane+captan caused less spray damage, though giving no better control of scab and mildew than lime-sulphur, but on James Grieve and Bramley's Seedling lime-sulphur compared more favourably.

Roach (F. A.). **Laxton's Superb Pear and fire blight.** *Agriculture, Lond.*, **47**, 11, pp. 574–577, 1 pl., 1961.

A note on the high susceptibility to both fire blight (*Erwinia amylovora*) [**40**, 315] and scab (*Venturia pirina*). Though the removal of secondary blossoms produced in the first 2 weeks of July might control fire blight it is preferable that this var. should be abandoned or topworked with other vars.

Blodgett (E. C.) & Aichele (M. D.). **The association of a red-leaf condition of Pear trees with Pear decline.** *Plant Dis. Reptr*, **44**, 12, pp. 904–907, 1 graph, 1960.

Pear trees in an experimental plot at Prosser, Wash., developed abnormally early red autumn coloration in association with root degeneration, which in conjunction with a lack of growth in the following spring suggests pear decline [**40**, 315].

Mikhaĭlova (Paraskeva). За есенното пръскане на някои костилкови видове. [Concerning autumn spraying of some stone fruit species.] – Овощарство [*Ovoshtarstvo*], **7**, 11, pp. 31–34, 1960.

At Inst. Plant Prot., Sofia, Bulgaria, inoculation of stone fruit trees after leaf-fall with spores of shot hole [*Clasterosporium carpophilum*: cf. **37**, 292] resulted in an infection of buds (100% in peach, 60% in apricot, and up to 50% in plum and cherry) in the following spring. Overwintering is made possible by tolerance of low temp., though mild winters preceded by periods of heavy rainfall were conducive to mass infection. Autumn spraying was most effective; in one set of trials 2% Bordeaux mixture, 3% Ba, and 1·5% selinon reduced infection from 26·82 in unsprayed to 6·48, 6·92, and 8·84%, respectively. Peach leaf curl [*Taphrina deformans*: **38**, 610], which was epiphytotic in 1960, should be treated with 2% Bordeaux mixture, 1:10 lime sulphur, or 3% Ba before buds develop.

Pine (T. S.) & Cochran (L. C.). **Noninfectious crinkle leaf on Santa Rosa Plum.**—*Phytopathology*, **50**, 10, pp. 701–703, 2 fig., 1960.

Field observations and transmission tests indicated that this disorder of *Prunus salicina* in the Yucaipa valley, S. Calif., is not graft-transmissible but is readily bud-perpetuated. Although the symptoms (dwarfing, leaf distortion, sterility of affected branches) resemble those of sweet cherry crinkle leaf and prune crinkle leaf [**36**, 769], there is no known relationship. It is concluded that the Santa Rosa crinkle leaf is due to a genetic instability.

Moriondo (F.). **Su un disseccamento parasitario dei Peschi segnalato in Toscana.** [On a parasitic withering of Peach trees reported in Tuscany.]—Reprinted from *Riv. Ortoflorofruttic. ital.*, **42**, 5–6, 8 pp., 3 fig., 1958. [Fr. summ.]

An account of peach canker, accompanied by withering of the young foliage, caused by *Fusicoccum amygdali* [**39**, 424] in different parts of Tuscany. J. H. Hale and Morettini 1 were less susceptible than other vars. Products containing Ca polysulphides were fungicidal to the pathogen.

Petersen (D. H.). **Hymenomycetous fungi except Polyporus associated with wood decay of living Peach trees in South Carolina.**—*Plant Dis. Reptr*, **44**, 12, pp. 891–893, 1960.

Of 22 such hymenomycetes isolated from peach trees in S. Carol. the most common were *Armillaria mellea*, *Clitocybe tabescens*, and *Stereum complicatum*: 16 spp. were new host records.

Daines (R. H.). **Dodine effective against bacterial spot of Peach.**—*Plant Dis. Reptr*, **44**, 11, pp. 826–827, 1960.

In spraying trials against *Xanthomonas pruni* on Sunhigh peach by Dept Plant Path., Rutgers Univ., New Brunswick, N.J., significantly better control (9·4% affected fruits) was given by dodine (1 lb./100 gal. at 300 lb. pressure every 10 days) [**39**, 479, 638] than by $ZnSO_4$+lime (5·5+12 lb.) or captan at 2–4 lb. (29–55% affected). Slight green or yellow fruit spotting occurred after dodine.

Cropley (R.). **Serological detection of a virus in Cherry trees with a leaf roll disease.**—*Nature, Lond.*, **188**, 4753, pp. 875–876, 1960.

Graft-transmission tests to indicators confirmed the presence of sweet cherry leaf roll virus [**35**, 305; **40**, 143] in 8 Kent orchards and 1 in Worcs. The virus was transmitted by sap inoculation from tobacco to sweet cherry and *Prunus pennsylvanica* seedlings and from sweet cherry to *P. pennsylvanica*.

In tests with rabbit antiserum prepared by injecting preparations from infective tobacco, sap from infected trees was antigenic undiluted or when diluted 1:2 with water, phosphate buffer, or Na diethyldithiocarbamate. No precipitation lines formed with similar preparations from trees infected by 6 other fruit viruses.

Gualaccini (F.). **La presenza della 'maculatura lineare' del Ciliegio in Italia: sua natura infettiva e sue correlazioni con altre virosi degli alberi fruttiferi.** [The presence of Cherry 'line pattern' in Italy: its infective nature and correlations between it and other viroses of fruit trees.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, **17** (*1959*), 2, pp. 141–168, 11 fig., 1960. [Engl. summ. 23 ref.]

This disease, present in the provinces of Bari and Rome, is characterized by chlorotic linear or ring-shaped leaf spots. It was transmitted by grafting from affected to healthy cherry trees of different vars. and to cherry seedlings. Inoculations from cherry to almond and apricot induced symptoms indicating that the disease is caused by the same virus complex that induces almond mosaic and apricot line-pattern in Italy [cf. **38**, 357]. Mazzard cherry F12/1 was the best indicator for the

cherry virus. The presence of symptoms on young wild cherries near infected cherry trees suggests that the virus may be seed-transmitted, which is being tested.

Schmidle (A.). **Ein Zweigsterben der Johannisbeere, verursacht durch Botrytis cinerea Pers. ex. Fr. II. Weitere Beobachtungen und Infektionsversuche an Roten und Schwarzen Johannisbeeren.** [Shoot die-back in Currants caused by *B. cinerea*. II. Further observations and infection trials on Red and Black Currants.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, **12**, 10, pp. 151–154, 6 graphs, 1960.

In further studies by the Inst. für Obstkrankheiten, Heidelberg, Germany [cf. **38**, 92], fungi isolated from dying black currant twigs were *Fusarium avenaceum*, *F. culmorum*, *Pestalotia* sp., *Alternaria* sp., and sporadically *Botrytis cinerea*. Inoculations of black currant with *B. cinerea* throughout the year induced local necroses up to 36 mm. but only those made in Nov. and Dec. caused die-back (89 and 83% respectively, by next Apr.), whereas inoculation of red currant produced necroses up to 100 mm. and some die-back at any time of the year. These results suggest that *B. cinerea* is only rarely a causal agent of black currant die-back under natural conditions.

Woodbridge (C. G.) & Drew (R. H.). **A boron deficiency dieback in highbush Blueberry.**—*Plant Dis. Reptr*, **44**, 11, pp. 855–857, 2 fig., 1960.

The highbush blueberry [*Vaccinium corymbosum*] vars. Pioneer and Pemberton, and to a lesser extent Stanley, suffered from B deficiency in W. Wash. during 1958 after a period of drought. Jersey was unaffected. Buds failed to develop and there was lack of vigour. Following applications of B (12 lb. solubor/acre) there was no reappearance of dieback symptoms in 1959 or 1960.

Chambers (J.). **The production and maintenance of virus-free Raspberry plants.**—*J. hort. Sci.*, **36**, 1, pp. 48–53, 1961. [15 ref.]

At the Scottish hort. Res. Inst., Invergowrie, Dundee, 7 raspberry vars. were freed from infection by some aphid-borne viruses (which apparently differ in their behaviour in plants at high temps.) by 2–3 weeks' exposure to 35° C. [**33**, 434] in an apparatus described. Treated plants must be well-established and have been out-of-doors for 1 season before treatment. Norfolk Giant and Malling Jewel were more readily cured than Lloyd George or Malling Promise. Rapid propagation of virus-free plants was by root cuttings taken in Dec., brought into heat at the end of Jan., and after 10–14 days used for shoot cuttings, which were subsequently given artificial light and then gradually hardened off and planted out in early May.

Borchardt (G.). **Vorkommen und Verbreitung der Erdbeervirosen und ihrer Überträger im Gebiet der Landwirtschaftskammer Hannover.** [The occurrence and distribution of Strawberry viruses and their vectors in the territory under the Hanover Chamber of Agriculture.]—*Z. PflKrankh.*, **67**, 8, pp. 449–475, 2 fig., 12 graphs, 2 maps, 1960. [3 pp. ref. Engl. summ.]

In this survey by the Inst. für Pflanzenpathologie und Pflanzenschutz, Göttingen Univ., and the Pflanzenschutzamt Hannover strawberry vars. were tested for viruses by stolon grafting to *Fragaria vesca* E.M. 1346 [**39**, 428]. With the exception of Sieger and Deutsch Evern all old vars. showed some infection, but among the new ones only those from S. Germany and the Elbmarsch, Kreis Harburg, were affected. Isolates were shown to belong to strawberry virus group 1 [strawberry mottle virus: **39**, 428]. There were no symptoms on the vars. tested, and only a few of these developed mild symptoms after inoculation with severe strs. From July 1956–Dec. 1958 17 aphid spp. were collected from cultivated strawberry plants from 146 sites in the Hanover area. The most common vectors were

Acyrthosiphon pelargonii ssp. *rogersii* and *Myzus ascalonicus*; *Pentatrichopus fragaefolii* was found only in the Elbmarsch; other spp. were rare.

Converse (R. H.). **Control of Phytophthora fragariae with soil fungicides.**—*Plant Dis. Reptr*, **44**, 12, pp. 948–951, 1960.

In field tests at Glenn Dale, Md, in 1958–60 red stele symptoms in Blakemore were reduced to 9·3% (plants infected) by trizone (8% propargyl bromide, 31% chloropicrin, 61% methyl bromide), fumigated at 51 gal./acre. With 4 other fumigants infection was 25–49% and with no treatment 94% [cf. **37**, 96].

Elarosi (H.). **Gloeosporium fruit rot of Banana.**—*Trans. Brit. mycol. Soc.*, **43**, 4, pp. 681–687, 1 pl. (3 fig.), 5 fig., 1960.

G. musarum was isolated from ripe fruit rot of bananas [cf. **37**, 175; **40**, 317] for the 1st time in Egypt in 1957. A detailed description is given of the pathogen in culture where it forms black sclerotia and of the method of invasion, from inoculation studies at Fac. Agric., Alexandria Univ. The hyphae aggregated together before penetrating the fruit.

Taylor (R. H.). **An investigation of the viruses which cause woodiness of Passion Fruit.**—Thesis summ. in *J. Aust. Inst. agric. Sci.*, **25**, 1, p. 71, 1959.

Investigations at Univ. Melbourne demonstrated that woodiness of passion fruit in Victoria [see below] is caused by cucumber mosaic virus str. This str. protected spinach and *Nicotiana glutinosa* plants against subsequent infection by an English str. of cucumber mosaic virus, though the latter did not protect spinach against the passion fruit str. The latter entered spinach plants infected beforehand with the English str. and gradually dominated it, the resulting disease being of a similar severity to that occurring in spinach affected by the passion fruit str. alone.

Seed transmission of cucumber mosaic virus could not be demonstrated in passion fruit, and the probable primary source of infection is from other hosts. A percentage of small seedlings of both passion fruit and *Passiflora caerulea* were freed from cucumber mosaic virus by heat therapy for 14 days at 37° C.

The Victorian isolate was distinct from that causing woodiness in Queensland [cf. loc. cit.].

Simmonds (J. H.). **Mild strain protection as a means of reducing losses from the Queensland woodiness virus in the Passion Vine.**—*Qd J. agric. Sci.*, **16**, 4, pp. 371–380, 5 fig., 1959. [Received Nov. 1960.]

Further details are given of information noticed in brief [**38**, 297]. Propagation of plants infected by Queensland woodiness virus (so far unidentified and distinct from the virus in New South Wales and Victoria [see above]) on to stocks resistant to *Fusarium* [*oxysporum* f. *passiflora*: **36**, 307], already a general practice, was by tip-grafting during the summer, when severe symptoms are at a min. Mechanical sap transfer might be equally effective where *Fusarium*-resistant stock is not necessary.

Chona (B. L.) & Lal (G.). **A new powdery mildew disease of Carica papaya in India.**—*Indian Phytopath.*, **12** (*1959*), 2, p. 186, [1960].

Oidium caricae [cf. **33**, 436; **34**, 659] on papaw, found near Delhi [**35**, 661].

Pettinari (Carla M.). **Secondo contributo alle ricerche su Cycloconium oleaginum Cast. e sul comportamento del parassita in Oliveti del Lazio.** [Second contribution to researches on *C. oleaginum* and its behaviour in the Olive groves of Latium.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, **17** (*1959*), 2, pp. 221–246, 5 fig., 1960. [Engl. summ. 21 ref.]

Observations are presented [**38**, 270], made from May 1955–May 1960, with particular reference to the number of new infections 100 leaves, the number of diseased leaves 100, and the number of mature leaves 100 on the branches examined each month. There was a correlation between the prevailing climatic conditions and infection. Inoculations of seedlings clarified the behaviour of the fungus between the end of spring and the renewal of activity that follows summer dormancy [cf. **40**, 320]. Studies were also made of the mycelium in infected leaves [**40**, 236]. The fungus was found not only on the leaf lamina, but often on the midrib, the petiole, the young branches, the fruit, and, occasionally on the young flower-buds.

Zattler (F.). **Bericht über die Welke-, Nematoden- und Virusforschung im Hopfenbau in den Jahren 1958 und 1959.** [Report on wilt-, nematode-, and virus research in Hop culture in the years 1958 and 1959.] —*Brauwissenschaft*, **13**, 5, pp. 159–161, 1960. [Engl. summ.]

Further details [**40**, 60] are given of the incidence of *Verticillium alboatrum* which has steadily increased of recent years in the Hallertau (Bavaria), Germany, the infected area of 55–60 ha. in 1956 and 80–90 in 1958 reaching over 120 ha. in 1959; in 1957 soil temps. of over 30° C. (opt. 20°–22°) brought the fungus to a temporary halt. In varietal trials Spalter was the most resistant (6·6% infection), followed by Hersbrucker and Rottenburger late (10·2), Hallertauer (33·8), and 2 selections (35 and 50). In further trials of 90 selected lines 2 were largely resistant and 6 tolerant.

None of the 21 fungicides tested on the leaves gave effective control, but some success was achieved with 4 of 22 soil disinfectants, though all were phytotoxic. Sanitary precautions should include the eradication (by intensive cultivation, not herbicides) of weeds, among which *Chenopodium album*, *Senecio vulgaris*, *Galinsoga parviflora*, and *Stellaria media* have been found to harbour *V. alboatrum*.

'Curl disease' [loc. cit.] appeared for the 1st time in some Hallertau gardens in 1959. Leaves with elongated middle lobes and a more or less ruffled surface develop on the side shoots; they may die from the margins. In the early stages the side shoots are weaker and hang more loosely than normal ones, imparting a bushy aspect to the plants. With the advance of infection only very much shortened shoots are produced, incapable of twining and directed diagonally upwards. The clusters are smaller, less well closed, and not so rich in lupulin; ultimately flowering and fruiting cease altogether. In 1 of the severely affected gardens only 100 of 1,700 plants appeared outwardly quite healthy.

Jermoljev (E.) & Kříž (J.). **Aktivita katalázy jako indikátor virové kadeřavosti Chmele.** [Catalase activity as an indicator of Hop virus 'curl disease'.]—*Ann. Acad. tchécosl. Agric.*, **33**, 8, pp. 1163–1174, 2 fig., 1960. [Russ., Germ. summ.]

Catalase activity, measured at Res. Inst. Plant Production, Ruzyně, and Hop Res. Inst., Žatec, by the vol. of O released in the reaction of leaf extract with H_2O_2, was approx. 4 times higher in curl infected leaves [str. hop nettle head virus: cf. above and **39**, 728] than in healthy. A detailed analysis of 168 samples of healthy plants and plants affected to various degrees by curl and infectious sterility [hop nettle head virus: **40**, 271] supplied data [tabulated], on the basis of which a scale was established enabling the detection of curl with 96% and of healthy plants with 90% reliability. More accurate results were obtained from 2 examinations within a short time. Chromatographic analyses of leaf protein agreed with the results of field tests in only 78% cases. Examinations of 68 apparently healthy plants from another hopyard revealed in 23·5% an increase in catalase activity to a degree suggesting the presence of curl in a latent form. A minute increase of catalase activity from nettle head virus was of no diagnostic value.

Annual Report of the Department of Hop Research, Wye College, 1959 (1st Apr. 1959—31st March 1960). – 154 pp., 2 pl., 4 fig., 17 graphs, 1960. 6*s*.

In the pathology sect. (pp. 27–30) [cf. **37**, 51] J. R. Coley-Smith & F. H. Beard report that hop downy mildew (*Pseudoperonospora humuli*) was controlled by Bordeaux powder (15–20 lb./acre) applied 3 times during Apr.-June or by captan or Bordeaux powder applied 6 times during Apr.–Sept. Captan dust was less effective than Bordeaux and its use in trials is being discontinued.

J. R. Coley-Smith (pp. 40–47) describes preliminary detached leaf and shoot tests for varietal resistance to *P. humuli*. Instead of placing detached leaves in Petri dishes [**21**, 391] the petiole of a leaf (from the 2nd node of a pot-grown plant) was inserted into a tube of distilled water and the leaf incubated at 20° C. in a humidity chamber. Leaf infection, as indicated by density of sporulation (which occurs only on the lower surface) was estimated as the no. of sporangia unit area. A standard conc. of 20,000 sporangia/ml. was used as inoculum. Differences in sporing rates on 5 hop vars. corresponded with the resistance reactions of unsprayed plants in the field.

In another series pot plants were cut back to produce lateral shoots which were sprayed with a standard suspension when 2·5 cm. long and incubated for 10–15 days in a cold frame; the % shoots that became 'lateral spikes' was counted.

It is concluded that both methods can be used successfully for assessing varietal reaction to *P. humuli*.

The overwintering of downy mildew is also described by J. R. Coley-Smith (pp. 107–114). Infected material was stained for 5 min. in 1% aqueous resorcin blue, rinsed in water, and washed for 2–4 sec. in each of 2 changes of absolute ethanol, cleared in xylene, and mounted in Canada balsam [cf. Fraymouth, **36**, 114]. Evidence was obtained that overwintering mycelium in the rootstock stimulates the production of primary basal spikes, and that oospores are of little effect in carrying over infection. It is probable that these primary basal spikes arise from buds into which the fungus grows in spring. If diseased cuttings are used the majority do not take, and of those that do, many produce basal spikes. Badly infected plants with large nos. of basal spikes are removed and destroyed when the hills are dressed. Where little infection is present it is sufficient to dust the hill and the growing shoots with Bordeaux powder. The 1st dusting was carried out when the shoots were 2–4 in. high, 3 early applications being effective even without 3 later ones.

Stapel (C.). **Sygdomme og skadedyr i Valmueafgrøder.** [Diseases and pests in Poppy crops.] –Reprinted from *Landbonyt*, *1960*, Sept., 3 pp., 3 fig., 1960.

Popular notes on the occurrence in opium poppy in Denmark of B and K deficiency, [unspecified] damping-off, *Peronospora arborescens*, and *Helminthosporium papaveris* [*Pleospora calvescens*: **36**, 515], with indications for control.

Mráz (F.). **Vliv škodlivého působení houby Helminthosporium papaveris Hennig na výnosy Máku v kraji Karlovy Vary v letech 1957 a 1958.** [Influence of the harmful effect of the fungus *H. papaveris* on Poppy yields in the region Karlovy Vary in the years 1957 and 1958.]—*Ann. Acad. tchécosl. Agric.*, **33**, 8, pp. 1083–1094, 2 pl., 5 graphs, 1960. [Russ., Germ. summ.]

The incidence of *H. papaveris* [*Pleospora calvescens*: cf. **37**, 732; **38**, 246, *et passim*] on opium poppy, varying from 2·48 to 98·75% according to the locality, was favoured by high temp. and heavy rainfall, particularly in July. *Ceutorrhynchus macula-alba*, which normally aids infection by causing wounds, was not detected. The yields in the attacked fields ranged from 655 to 997 kg./ha. instead of an expected 1,000. Seed treatment with agronal (50 g./10 kg.) is recommended; if properly stored the treated seed can be safely sown in the following year.

Schuster (M. L.) & Nuland (D. S.). **Seed transmission of Safflower Verticillium wilt fungus.**—*Plant Dis. Reptr*, **44**, 12, pp. 901–903, 1960.

Evidence was obtained at Neb. agric. Exp. Sta., Lincoln, that *V.* sp., found in a nursery and hitherto reported on safflower only from Russia (*Trud. Acta Univ. Asiae Mediae* Ser. VIII-b, Bot., pp. 1–77, 1937), is carried in safflower seeds, being present in 9% of 370 seeds selected from wilted plants. The *V.* isolates from safflower also proved pathogenic to potatoes.

Yermanos (D. M.) & Knowles (P. F.). **Effects of gibberellic acid treatment on Safflower.**—*Agron. J.*, **52**, 10, pp. 596–598, 1 fig., 1960.

At Univ. Calif., Davis, foliar sprays of gibberellic acid induced internode elongation of safflower stems, chlorosis, sterility, a reduction of seed yield (but not seed wt.) and oil content, and increased susceptibility to *Phytophthora* [*drechsleri*: **39**, 483] root rot.

Schuster (G.). **Die Auswirkung von Virusinfektionen auf den Alkaloidgehalt ein- und zweijähriger Rassen von Hyoscyamus niger L. bei Anzucht im Lang- und Kurztag.** [Effect of virus infections on the alkaloid content of one- and two-year-old *H. niger* stocks grown under long and short day conditions.]—*Ber. dtsch. bot. Ges.*, **73**, 8, pp. 319–325, 1960.

Inoculations at Inst. für Phytopathologie, Univ. Leipzig, Germany, of *H. niger* plants with str. H 19 of potato virus X produced changes in the alkaloid content similar to those produced in *Datura stramonium* var. *stramonium* [cf. **37**, 365] and *Nicotiana* vars. or spp. [cf. **38**, 36]. These changes occurred independently of the stage of development of the host.

Shanta (P.) & Menon (K. P. V.). **Cowpea (Vigna sinensis Endl.), an indicator plant for the Coconut wilt virus.**—*Virology*, **12**, 2, pp. 309–310, 1 fig., 1960.

At the Central Coconut Res. Sta., Kerala, S. India, the 2 primary leaves of 1-week-old cowpea seedlings grown in steam-sterilized soil were inoculated by abrasion with crude sap prepared by freezing tender leaves of infected coconut overnight and extracting in 2·5 vol. of 0·05 *M* phosphate buffer at pH 8. Of 355 seedlings of 5 different cowpea vars., 255 became infected, though none of 260 plants similarly inoculated with sap from healthy plants did so. When 10–12 adults of *Stephanitis typicus* [**39**, 436] were put on cowpea plants for 2–3 days after 24 hr. feeding on diseased coconut plants, 29 of 37 seedlings developed symptoms. *S. typicus* adults collected from coconut palms in a heavily infected area transmitted without preliminary feeding on affected material.

On cowpea the characteristic symptoms are malformation and crinkling of the leaves. Symptoms appear in 4–12 days as a slight clearing of the veins and veinlets of the unfurling, 1st trifoliate leaf. This is followed by similar vein-clearing of the subsequent leaves. Tearing of the leaves along the veins may occur. On many older leaves there is a slight yellowing along the margins, the area near the midrib being a darker green. Masking occurs towards flowering, but many axillary shoots in the flush of growth bear similar symptoms.

Fiskell (J. G. A.). **Chemical studies on the roots and leaves of Coconut palms affected by lethal yellowing.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 408–413, 1960.

An investigation into the mineral composition of healthy coconut palms, which in Fla are used primarily as ornamentals, and those in various stages of decline caused by the lethal yellowing disease [**38**, 485] showed a wide range in the content of essential elements. If early yellowing of the fronds is not cured by Mn applications and a complete fertilizer, then it is probable that the tree is suffering from lethal yellowing [see below].

Van Weerdt (L. G.), Martinez (A. P.), & Esser (R. P.). **Results of a survey designed to determine the etiology of lethal yellowing of Cocos nucifera L.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 421–430, 1960.

No additional data in support of the hypothesis that a virus is the causal agent of coconut palm lethal yellowing [**35**, 366 and above] was obtained, nor could the disease in Key West be attributed to adverse soil condition, insects, fungi, or bacteria. It is possible that the nematode *Rotylenchulus*, about which little is known, may be involved in the etiology of the disease, the spread of which was prevented by the application of nematicides.

Ferrand (M.). **Observations sur une maladie indécise du Cocotier.** [Observations on an indeterminate disease of Coconut.]—*C.R. Acad. Agric. Fr.*, **46**, 12, pp. 706–707, 1960.

This disease, somewhat resembling the Kainkopé disease of French Togoland [cf. **38**, 760], is reported from N.E. Colombia and the neighbourhood of Cartagena, where it is called 'poloca' (wilting). It is considered to be a consequence of the very dry climate of the area and absence of the higher water table present in other dry areas of N. Colombia. [The disease would appear to be similar to 'drought wilt': cf. **24**, 367].

Eighth Annual Report of the West African Institute for Oil Palm Research, 1959–1960.—144 pp., 3 col. plans, [1960]. 2*s.* 6*d.*

In the report [cf. **39**, 485] of the plant nutrition division (pp. 93–106) R. A. Bull records further studies on Mg and K deficiency of mature palms and describes the symptoms. There are 4 well marked symptoms of K deficiency: orange spot [cf. **36**, 401, *et passim*], best regarded as a sign of premature senescence, usually associated with K deficiency in Nigeria; the so-called orange spot—orange frond complex [cf. **34**, 719; **37**, 366], now to be known as the 'Mbawsi symptom', also due primarily to K deficiency; mid-crown yellowing (symptom C) [**36**, 402] often associated with 'Mbawsi'; and terminal and marginal leaflet necrosis, which may lead to the death of affected leaves, and if extensive on old leaves usually denotes K deficiency in Nigeria where it is associated with orange spotting or the 'Mbawsi symptom'. Care is required in diagnosis to distinguish this type of necrosis from that induced by severe *Cercospora* [*elaeidis*: cf. **38**, 327] infection. Experimental evidence indicated that the symptom of P deficiency in mature palms is also a necrosis of old leaves but without chlorosis.

J. S. Robertson, reporting the work of the plant pathology division (pp. 106–112), states that in spraying trials against freckle (*C. elaeidis*), in which infection was assessed on the 3rd leaf from each seedling, there was no significant difference in the highly significant reduction of infection given by ziram, phaltan, and cuman.

In a further experiment on the effect of irrigation on blast disease using non-vigorous seedlings planted 1 month after the general nursery and therefore at the highly susceptible stage incidence was reduced from 13·8 to 4·9% by irrigation in Aug. and Sept. The *Pythium* sp. [**39**, 486] isolated from affected palms was grown in modified Knop's solution containing 1% glucose, 0·1% asparagine, and 1 p.p.m. thiamin, and the cut tops of tomato seedlings grown in the filtrate at various dilutions. Toxicity symptoms, a gradual curling and twisting of the leaves, appeared within 12 hr., followed by necrotic spots at the margins of the lower ones leading to general necrosis.

A new disease, 'dry basal rot', attacking palms 4 or 5 yr. after planting, was reported from 1 small estate in the W. Region. The 1st symptom is usually a rotting of fruit bunches. Later certain leaves, generally the lower ones, develop a sub-median fracture of the rachis, and though on such leaves the leaflets remain green

and healthy for some time, they finally die. Younger leaves then collapse and the symptoms gradually become more severe until the palm dies. A basal dry rot is present inside the stem, infection occurring via the roots. *Ceratocystis paradoxa* was isolated from affected tissues. Preliminary experiments suggested that the leaf symptoms result from a combination of water stress and the effect of a toxin released by the fungus. It appears that considerable recovery can take place after the onset of the rains.

In an investigation of the little leaf–bud rot complex [cf. **39**, 185] the primary spear rot was cut away; palms so treated did not produce 'little leaves' and there was no recurrence of the spear rot, which indicates that (in Nigeria) the disease is caused by a pathogenic organism, but it has not yet proved possible to reproduce the rot by inoculation with rotting spear tissues.

Broadbent (L.) & Heathcote (G. D.). **Detection of leaf roll in Potato tubers.**—*Plant Path.*, **9**, 4, pp. 126–128, 1 fig. (on Pl. 3), 1960.

At Rothamsted exp. Sta., Harpenden, staining tuber sections in 1% resorcin blue in 0·1% ammonia [**39**, 729] gave 61% indication of infection as determined by later growth in the field. Of the plants not developing leaf roll, 9% were from non-staining tubers. Other tubers treated with rindite to break dormancy immediately after lifting in mid-Aug. were planted at the end of Aug. in the open or under an unheated Dutch light. Potato virus Y symptoms were diagnosed in some of the plants under glass in mid-Oct. but growth was too poor to permit diagnosis of leaf roll. It was concluded that the staining technique is unreliable and that the method of growing tubers in the autumn is not possible under English climatic conditions.

Burt (P. E.), Broadbent (L.), & Heathcote (G. D.). **The use of soil insecticides to control Potato aphids and virus diseases.**—*Ann. appl. Biol.*, **48**, 3, pp. 580–590, 1 graph, 1960.

At Rothamsted exp. Sta. the insecticides thimet 44-D, applied along the furrows with the fertilizer at planting, and rogor, applied in individual doses beneath each tuber, kept potato plants free from aphids (mainly *Myzus persicae*) from 1 week after emergence until early Aug. All treatments prevented or greatly reduced the spread of leaf roll virus from infector plants, though spread of virus Y was only slightly decreased [**38**, 651].

The possibilities of soil treatments with insecticides in relation to the control of potato virus diseases are discussed.

Cadman (C. H.) & Chambers (J.). **Factors affecting the spread of aphid-borne viruses in Potato in eastern Scotland. III. Effects of planting date, roguing and age of crop on the spread of Potato leaf-roll and Y viruses.**—*Ann. appl. Biol.*, **48**, 4, pp. 729–738, 1960.

At the Scot. hort. Res. Inst., Dundee [cf. **38**, 761; **39**, 261], field tests from 1953–58 showed that spread of leaf roll and virus Y varied from year to year and that Y invariably spread more than leaf roll. Spread was generally gauged from the tuber progeny of 3 or 4 plants in a drill on either side of a virus infector. Most of the virus Y spread occurred before the end of June, and most of the leaf roll before the end of July. Both viruses spread slightly more in late- than in early-planted crops. When leaf roll plants bearing *Myzus persicae* were planted in a healthy crop of Majestic at intervals during the season virus spread declined rapidly as the crop aged. In 1955 leaf roll spread in all of 25 seed crops in different parts of E. Scotland, but in only 20 of 36 similar crops in 1956. Annual and regional differences in spread probably reflect differences in the time at which aphids reach the plants in early summer and the rate at which infestation builds up. In general the results confirm

the view of Hollings [**38**, 329] that areas in which crops consistently become colonized by *M. persicae* late in the season are those in which viruses spread least. They suggest also that leaf roll and virus Y are more likely to spread in coastal than in inland parts of E. Scotland.

Ross (H.). **Die Praxis der Züchtung auf Infektionsresistenz und extremer Resistenz (Immunität) gegen das Y-Virus der Kartoffel.** [The practice of breeding for resistance to infection and extreme resistance (immunity) against Potato virus Y.]—*Europ. Potato J.*, **3**, 4, pp. 296–306, 4 fig., 1960. [Engl., Fr. summ.]

Resistance to viruses Y [cf. **38**, 763] and A in many potato vars. in the German collection (either based on the original S. American primitive forms or possessing *Solanum demissum* and *S. andigena* genes) and in cross-bred hybrids was further assessed at Max Planck-Inst. für Züchtungsforschung, Köln-Vogelsang, by methods which are described. Immunity was conferred by a dominant gene, the source being the Mexican wild sp., *S. stoloniferum*. Some hybrids were immune also from potato virus X. Crosses between vars. susceptible to Y and immune hybrids yielded 35–45% immune seedlings; these were selected by rubbing 3 times with virus Y sap inoculum and testing symptomless individuals for freedom from the virus the following year. The final test for immunity was by core-grafting.

Stace-Smith (R.) & Reichmann (M. E.). **Infectivity studies on Potato virus X and its virus nucleic acid.**—Abs. in *Proc. Canad. phytopath. Soc.*, **27**, p. 16, 1960.

Infectious ribonucleic acid obtained from potato virus X at the Canada Dept Agric. Res. Sta., Vancouver, B.C., was 5·7 times more infectious on *Chenopodium amaranticolor* than on *Gomphrena globosa*.

Calvert (E. L.). **Potato virus A in the variety Ulster Torch.**—*Plant Path.*, **9**, 4, pp. 144–146, 1 fig., 1960.

At Plant Path. Div., Min. Agric., Northern Ireland, crops of Ulster Torch potatoes with mosaic symptoms varying from a mild blotchy mottle to a severe chlorotic mottle with distortion and dwarfing of leaves and red brown pigmentation and necrosis were found to be infected with virus A [**39**, 455], diagnosed by sap inoculations to White Burley tobacco and *Solanum demissum* P.I. 175404 [**35**, 119]. Core grafting to tolerant vars. distinguished 4 strs. of virus A, varying in severity; the more virulent may have originated from an initial infection of Ulster Torch with a mild str.

Gabriel (W.) & Roztropowicz (Stanisława). **Wstępne wyniki badań nad występowaniem wirusa S na Ziemniakach w Polsce.** [Preliminary data from a study of the occurrence of virus S on Potato in Poland.]—*Postępy Nauk rol.*, **6**, 3, pp. 53–67, 1959. [Engl. summ. Abs. in *Referat. Zh. Biol.*, *1960*, 14, p. 178, 1960.]

Van Slogteren's serological method showed all 19 vars. tested to be infected by virus S [cf. **38**, 330]. Baltic, Vulcan, Nova Khuta, and in some cases Dar (Ackersegen) were especially severely infected. Most resistant were Flora, Lenino, Pioneer (Voran), and Parnassia.

Lovisolo (O.) & Benetti (Maria P.). **Sulla presenza in Italia dei virus S ed M della Patata.** [On the presence in Italy of Potato viruses S and M.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, **17** (*1959*), 2, pp. 211–219, 1960. [Engl. summ. 15 ref.]

After a general note on potato viruses S and M [cf. **40**, 238] the author lists the Italian and imported potato vars., on which S has been recorded since the beginning of 1957. Virus M accompanied S in 1 var. (Bianca di Vallada).

Kassanis (B.). **Potato virus M and paracrinkle.**—*Nature, Lond.*, **188**, 4751, p. 688, 1960.

The author disagrees with the suggestion [**39**, 730] that King Edward potato stocks are uniformly infected by virus S+paracrinkle virus. During 2 yr. of testing at Rothamsted exp. Sta. 90% of the plants in 2 stocks contained only paracrinkle, and 1 plant only virus S.

Tomato plants (hosts for paracrinkle but not S) inoculated with sap from King Edward leaves and scions were later grafted to virus-free Arran Victory potato plants. Symptoms varied from typical, severe paracrinkle to leaf-rolling mosaic or chlorotic blotching with little distortion. This range was similar to that produced on infecting Arran Victory containing virus S.

Some stocks of King Edward contained paracrinkle strs. transmissible by *Myzus persicae* [**40**, 238]; others did not, though identical symptoms were produced on grafting to Arran Victory.

It is concluded that potato paracrinkle virus varies in virulence in different King Edward plants, some strs. being indistinguishable from virus M.

Munro (J.). **The reactions of some Potato varieties and seedlings to Potato virus F.**—*Amer. Potato J.*, **37**, 8, pp. 249–256, 5 fig., 1960.

The reactions of 30 potato vars. and seedlings to 2 strs. of potato virus F [potato aucuba mosaic virus str: **40**, 180] alone or with potato virus A, X, or Y were studied at the Plant Path. Lab., Fredericton, N.B. Mechanical inoculations with F alone were unsuccessful, but grafting resulted in severe necroses. Brown necrotic lesions and blotches were produced by inoculation with F+A, F+X, and F+Y, and by mechanical inoculation with F on any plant already infected by X, Y, or A. One str. of F caused tuber necrosis in all the test vars., the other in only 4 of them. F is of value in stimulating the reaction of indicator seedlings to infection by X or A, making back-inoculations or serological confirmatory tests unnecessary.

Wenzl (H.). **Zur Wirkung von Dichlordiphenyltrichloräthan (DDT) bei der Kartoffel.** [The effect of DDT on the Potato.] —*PflSchBer.*, **24**, 5–7, pp. 83–89, 1960. [Engl. summ.]

In trials by the Bundesanstalt für Pflanzenschutz, Vienna, DDT applications gave pronounced yield increase only when stolbur disease [tomato stolbur virus: **38**, 538; **40**, 61] was severe. Incidence was somewhat decreased by the treatment which probably also had some stimulatory effect on yield. Spread of leaf roll virus was slightly reduced [cf. **38**, 651].

Staĭkov (G.), Shtŭrbova (Mme D.), & Toncheva (Mme Ts.). Върху възможностите за използуване на луминесцентния анализ за предварително откриване на някои болести при Картофите. [On the possibilities of an application of luminiscent analysis for the detection of some diseases of Potato.]—Науч. Труд., Пловдив [*Nauch. Trud., Plovdiv*], **7**, pp. 9–15, 1960.

By the light of a quartz lamp (Delta type 09) at the Higher Inst. Food Industry, Plovdiv, Bulgaria, healthy potato tubers of 27 vars. [listed] fluoresced yellow, red, or brown, and tubers with spindle sprout blue, the exact shade depending on the var. and the degree of the disease. An exception was Ranni rozovi, healthy tubers of which fluoresced pale blue. No fluorescence was noticed in the leaves of the diseased Bintje, Cardinal, Faraon [? Voran], or Kitting. Healthy stems of the same vars. showed pale blue and diseased deep blue or blue-pink. Light analysis enabled early detection of spindle sprout (in some vars. with more than 90% reliability) and it can be used for selection of planting material and detection of latent forms of degeneration.

Wenzl (H.). **Die Frühdiagnose der Fadenkeimigkeit bei Kartoffeln.** [The early diagnosis of spindle sprout in Potato.]—*PflSchBer.*, **24**, 11–12, pp. 69–180, 1 fig., 1 graph, 1960. [Engl. summ.]

At the Bundesanstalt für Pflanzenschutz, Vienna, clear differences in sp. gr. were found between normal tubers of Allerfrüheste Gelbe, Virginia, and Voran and spindle sprout tubers from plants of the same vars. infected by [tomato] stolbur virus [**39**, 185 and above], the latter containing less starch than the former. Infection, by killing the roots, may lead to withdrawal of water from the tubers. Such softened tubers though infected may contain more starch than healthy ones and have a higher sp.gr.; they should therefore be separated before grading. The difference in sp.gr. between normal and spindle sprout tubers (more pronounced in large tubers and probably also in vars. with a high starch content) is sufficient to permit grading with only a small margin of error.

Lippert (L. F.). **Physiological and anatomical characteristics of spindling-sprouted Potato tubers.**—*Amer. Potato J.*, **37**, 10, pp. 313–324, 2 fig., 3 graphs, 1960. [19 ref.]

In assays at Univ. Calif., Riverside [**40**, 239], the conc. of indole acetic acid was higher in extracts from Russet Burbank spindle sprout tubers than in those from normal tubers, whereas a growth-inhibiting substance was present in significant amount only in the latter. In White Rose, however, no differences in growth regulators were observed. In addition, 2 organic acids, 1 with an Rf value similar to that of tartaric acid, were found in chromatograms from affected tubers but not in healthy ones. Generally, spindle sprout tubers had a lower sp.gr. and higher soluble solids [cf. above]. Anatomical studies revealed callose deposits [cf. **39**, 729] in the internal phloem of lacmoid-stained sections of spindle sprout tubers which were not present in tubers with normal sprouts.

Hirst (J. M.) & Stedman (O. J.). **The epidemiology of Phytophthora infestans. I. Climate, ecoclimate and the phenology of disease outbreak. II. The source of inoculum.**—*Ann. appl. Biol.*, **48**, 3, pp. 471–488, 1 pl., 39 graphs; pp. 489–517, 29 plans, 11 graphs, 1960. [25 & 32 ref.]

In I observations on potato crops from 1951 to 1958 at Rothamsted exp. Sta. [**38**, 651] are described which showed that when much bare ground was exposed the air within the crop was warmer and less humid at midday than that 4 ft. above the ground, especially in dry and sunny weather. Foliage growth and the amount of sunshine and rain determined how soon this pattern was replaced by one with smaller temp. differences and a crop humidity slightly > the humidity above it at all times of day. Rain on densely leafy crops eliminated temp. differences and gave R.H. values > 90%, more persistent in the crop than in the screen. Finally, as blight defoliated the crop the relationship partly reverted to that existing before.

Above the crops the no. of hr./day with R.H. not < 90% rose and fell with the passing of wet spells. At first this was true within crops also, but when the foliage was thick the rise in R.H. after rain often persisted through dry intervals. Such conditions usually preceded epidemic outbreaks of blight by 1–3 weeks. Growth thus appears to modify the immediate environment in such a manner as to favour the spread of *P. infestans*.

In II it is stated that of 3,260 blighted tubers planted as seed in 5 successive yr. (1954–58), 21 produced stems invaded from below ground by *P. infestans* (0·79 and 0·52%, respectively, of tubers infected artificially and naturally). Only in 1955 was no stem invaded; in every other yr. they started epidemics in experimental plots. The 1st stem lesions mostly appeared 62 days after planting and 38 days before an outbreak became general. Distant spread was probably by air-borne sporangia, and that nearer the initial sources by water-borne. In certain

soil-moisture conditions *P. infestans* from inoculated tubers planted as seed appeared to pass through the soil and infect leaves near it, so starting epidemics without invading stems from below ground. Such attacks developed similarly to those from invaded stems.

Wallin (J. R.) & Schuster (M. L.). **Forecasting Potato late blight in Western Nebraska.**—*Plant Dis. Reptr.* **44**, 12, pp. 896–900, 1 graph, 1960.

Details are given of the use of temp.-R.H. data for forecasting outbreaks of *Phytophthora infestans* during 1952–59 [**39**, 612]. The forecasts were generally accurate and warned growers 1–28 days before the disease was actually observed. The results indicated the importance of setting up the recording instruments during the emergence period. The fungus was unable to survive 3 weeks of unfavourable climatic conditions.

Hodgson (W. A.). **Field resistance to Potato late blight.**—Abs. in *Proc. Canad. phytopath. Soc.*, **27**, p. 13, 1960.

At Canada Dept Agric. Res. Sta., Fredericton, N.B., the lower leaves of potato were most susceptible and the upper ones least [to *Phytophthora infestans*: **40**, 240]. More highly conc. inoculum was required to cause disease in highly resistant than in moderately resistant vars. in the field.

Andrén (F.) & Olofsson (B.). **Besprutningsförsök mot Potatisbladmögel 1959.** [Spraying experiments against Potato blight 1959.]—*Växtskyddsnotiser, Stockh.* **24**, 1, pp. 9–11, 1 fig., 1960.

At the headquarters (Bergshamra) of the spraying operations the dry weather completely prevented the development of infection by *Phytophthora* [*infestans*: cf. **39**, 241], but at the Åkarp branch the pathogen was favoured by damp weather at the end of July and heavy rain in early Aug. The av. yield increase from spraying was 38%, the performance of Cu compounds being approx. 20% inferior to that of maneb (manzate S, 2 kg. ha. and application, maneblan 2·4 kg., and maneb Bayer 2·2·5 kg.) and tin (brestan 1·2–1·8 kg., the same + $MnSO_4$ at 0·1%, and an experimental preparation at 0·2%).

Bojňanský (V.). **Rozvoj rakoviny Zemiakov Synchytrium endobioticum (Schilb.) Perc. v rôznych pôdnych typoch. Predbežná zpráva.** [The development of Potato wart *S. endobioticum* in different soil types. Preliminary report.]—*Biológia, Bratislava*, **15**, 3, pp. 211–217, 1 graph, 1960. [Russ., Germ., Engl. summ.]

The development of *S. endobioticum* was studied in the susceptible var. Wohltmann in a cold, humid region of Czechoslovakia [**39**, 731] favourable to the growth of the pathogen, using 400 kg. each of various soil types. Only a few very small warts were formed on the tubers in soils from dry, warm districts, but they were larger and more plentiful in those from mountainous and submountainous areas. The physico-chemical conditions of the soil did not appear important in relation to incidence, which is thought to depend rather on the biological properties of the soil, especially the numbers of antagonistic microflora.

Reĭngard (T. A.) & Pashkar' (S. I.). К участию ростовых веществ типа ауксинов в образовании раковых наростов у Картофеля. [The participation of auxin-type growth substances in the formation of wart tumours in Potato.]—Физиол. Раст. [*Fiziol. Rast.*], **5**, 6, pp. 501–508, 1958. [Engl. summ.]

In further work at the All-Union sci. Res. Sta. for Potato Wart, Chernovitsy [**39**, 489], the formation of warts (*Synchytrium endobioticum*) was found to be accompanied by the production of large amounts of growth substances, most being present in the peripheral zone of intense growth and more in warts than in the

healthy tissue of the infected organ. The free fraction of the growth substances in warts has a higher sp.gr. than that of healthy shoots, and they also have a high content of a component sensitive to peroxide. No clear differences were detected in the total content or in the ratio of the free and bound fractions of growth substances in the shoots of resistant and susceptible potato vars. [cf. **40**, 242].

Trochinskiĭ (I.) & Korȳtko (G.). Срок карантинирования очагов рака. [The quarantine period for wart foci.]—Картофель Овощи [*Kartofel' Ovoshchi*], **5**, 11, p. 55, 1960.

Observations in 1949–50 and 1952 revealed that there were up to 10% haulms infected by potato wart [*Synchytrium endobioticum*: **39**, 653] on 155 farms, 10–35% on 13 farms, and 100% on 1 farm in the Zhitomir region, U.S.S.R. Foci observed in 1949 were treated with chloropicrin in summer 1950. Strict quarantine was imposed at Bȳkovka during 1953–57, no potatoes or tomatoes being planted. Soil samples taken from infected sections in 1957 appeared to contain no sporangia. In 1958–59 potatoes were again planted. No infection was noted in the growing period or during lifting. It is concluded that a test of infected land should be made after 5 yr. by planting susceptible potato vars.

Herzog (W.) & Wartenberg (H.). **Der Konservierungseffekt antibiotischer Mikroorganismen an den Sklerotien von Rhizoctonia solani (Kuhn).** [Preservative effect of antibiotic micro-organisms on the sclerotia of *Corticium solani*.]—*Ber. dtsch. bot. Ges.*, **73**, 8, pp. 346–348, 1960.

In further experiments at the Friedrich Schiller Univ., Jena, Germany [**38**, 98], sclerotia of *C. solani* from 2- (and 5) yr.-old potato haulm compost germinated in 73% (37%) cases if untreated, in 100 (50) after a hydramon bath, and in 60 (27) after a hydramon bath and subsequent reinoculation on the decaying material. These results indicate that the viability of the sclerotia was greater when fungistatic antibionts were absent, this confirming previous findings.

Vitukevich (E. R.) & Sokol (P. F.). Оспа на клубнях Картофеля во время хранения. [Pox on Potato tubers during storage.]—Науч. Труд. Укр. н.-и. Инст. Овощ. Картоф. [*Nauch. Trud. Ukr. n.-i. Inst. Ovoshch. Kartof.*], *1959*, 5, pp. 301–311, 1959. [Abs. in *Referat. Zh. Biol.*, *1960*, 15, p. 174, 1960.]

Bacteria were isolated from the majority of potato tubers affected by pox, stored in trenches and covered over with earth at low temp. *Fusarium* spp. were isolated from tubers stored with SO_2 at 9–13° [C.]. Inoculation of healthy tubers with pure cultures of the bacteria and fungi isolated showed them to be non-infectious. Pox appeared on the tubers as the result of the action of toxins on them, for example SO_2, formalin, Bordeaux mixture etc. CO_2 in high concs. (over 6%) at low temp. (1° to −1°) produced pox when storage conditions induced such conc.

Dierks (R.). **Über Versuche zur chemischen Bekämpfung des Pulverschorfes (Spongospora subterranea (Walbr.) Johnson) der Kartoffel.** [On tests for the chemical control of powdery scab (*S. subterranea*) of Potato.]—*Pflanzenschutz*, **12**, 7, pp. 91–92, 95–97, 2 fig., 1960

In a 4-yr. series of experiments by the Bayerische Landesanstalt für Pflanzenbau und Pflanzenschutz, Munich, quintozene completely disinfected the soil in pots when it was thoroughly mixed in before planting. Other chlornitrobenzene compounds and $CaCN_2$ were also effective. In the field, however, all the treatments proved unsatisfactory [cf. **40**, 124].

Doyle (J. J.) & MacLean (A. A.). **Relationships between Ca:K ratio, pH, and prevalence of Potato scab.**—*Canad. J. Pl. Sci.*, **40**, 4, pp. 616–619, 1960.

In a survey of 10 soil types at Fredericton, N.B., the incidence of potato scab

(*Streptomyces scabies*) [**33**, 623] was associated with high pH and wide Ca:K ratios. Under controlled conditions in the greenhouse, however, scab incidence was independent of the Ca:K ratio and directly related to pH.

Sill (W. H.), Lal (S. B.), Del Rosaria (Maria S. E.). **Additional evidence that Sweetpotato mosaic virus is a strain of Tobacco mosaic virus.**—*Phytopathology*, **50**, 10, pp. 709–711, 1 fig., 1960.

In electron micrographs at the Kans. agric. Exp. Sta., Manhattan, of semi-purified leaf extract of tobacco inoculated with sweetpotato mosaic virus [see below] the characteristic rod-like particles were morphologically identical with those of tobacco mosaic virus. There was also a close serological relationship between the 2 viruses, sweet potato mosaic probably being a str. of tobacco mosaic virus.

Elmer (O. H.). **Etiology and characteristics of Sweetpotato mosaic.**—*Phytopathology*, **50**, 10, pp. 744–749, 3 fig., 1960.

Most of this information has been noticed [**36**, 422]. The virus was transmitted by grafting from tobacco to sweet potato fleshy roots. It remained infectious for 3 yr. in tobacco sap. Virus conc. was high in infected tobacco leaves [cf. above] but low in sweet potato fleshy roots.

Clerk (G. C.). **A vein clearing virus of Sweetpotato in Ghana.**—*Plant Dis. Reptr*, **44**, 12, pp. 931–933, 6 fig., 1960. [16 ref.]

The name vein clearing virus is suggested for an undescribed disease affecting sweet potato in Ghana. The virus was transmitted by *Bemisia tabaci*, tuber core grafting, and patch grafting, but not by *Cuscuta chinensis* or mechanical inoculation. Vein clearing in Ghana shows some similarities to virus B of E. Africa [**37**, 110] and vein clearing in Israel [**39**, 496], though the latter is not sap-transmissible to other hosts as is virus B.

Bald (J. G.). **Forms of Tobacco mosaic virus.**—*Nature, Lond.*, **188**, 4751, pp. 645–647, 1960. [27 ref.]

The main biological criterion for a form is defined by the presence and persistence, as a natural infection in 1 or more host spp., of a type of tobacco mosaic virus with uniform biophysical properties. Biological properties divide the naturally occurring forms into categories similar to those delimited biophysically. An example is cited of 2 forms of the virus isolated from different spp. in the same plant community at Univ. Calif., Los Angeles, str. U 5 from *Nicotiana glauca* [**40**, 62] and a form from *Solanum xantii* which produced on *N. glutinosa* small, white, local lesions, distinct from the necrotic local lesions of strs. U1 and U2, and on *N. sylvestris* mosaic symptoms. There is some evidence that the virus in tomato differs from that in tobacco.

In natural infections in 1 plant sp. there is usually 1 form or a few; generally 1 is dominant and symptom variants of this may be present as minor constituents of the virus in other spp. The occurrence of similar forms in individuals of a host growing in widely separated areas suggests that these associations are not entirely of regional origin.

The nature of selectivity between host spp. and forms of the virus and reasons for the mixture of minor forms with dominant ones in some hosts are discussed.

Miczynski (K. A.). **An attempt to inhibit the multiplication of Tobacco mosaic virus in tissue culture by its antiserum.**—*Ann. appl. Biol.*, **48**, 4, pp. 739–741, 1960.

In a study at Rothamsted of the possible movement of protein through cell walls the author (bot. Inst., Coll. Agric., Cracow, Poland) found that tissue extracts from cultures of tobacco tissue infected by tobacco mosaic virus [**37**, 184] grown in an

agar medium containing antiserum had only $\frac{1}{2}$–$\frac{1}{16}$ of the virus in extracts of tissues grown without antiserum. When the former tissues were washed before extraction the extracts contained as much virus as the latter. As the antiserum had no effect on virus multiplication the possible reasons for the reduction are discussed.

McKeen (C. D.) & Boyce (H. R.). **An overwintering host for Tobacco etch virus in southwestern Ontario.**—Abs. in *Proc. Canad. phytopath. Soc.*, **27**, p. 15, 1960.

In areas near Harrow, Ont., with a high incidence of tobacco etch virus in tobacco and sweet pepper [*Capsicum*] crops, 25% of *Physalis heterophylla* [cf. **38**, 441] in the vicinity were also infected. The less prevalent *P. subglabrata* also harbours the virus.

Valleau (W. D.). **Tobacco diseases in Venezuela.**—*Plant Dis. Reptr*, **44**, 12, pp. 928–930, 1960.

Notes on 10 diseases, complementary to the 1957 records [**37**, 246; cf. **40**, 384], include details of tobacco etch virus, 1st recognized in 1959, though probably present before.

Izard (C.). **Sur une méthode de culture de Peronospora tabacina Adam au laboratoire.** [On a method of culture of *P. tabacina* in the laboratory.]—*C.R. Acad. Sci., Paris*, **251**, 25, pp. 3063–3064, 6 fig., 1960.

P. tabacina caused substantial damage in France during 1960 [**40**, 248]. At Inst. exp. des Tabacs, Bergerac, the fungus was cultured on var. Burley and *Nicotiana glutinosa* leaf disks 12–14 mm. diam. inverted in Petri dishes on 3 layers of filter paper impregnated with a nutrient solution; the lids of the dishes were lined with 2 layers of filter paper saturated with water. The cultures were kept at 20° during the day and 10–15° C. at night. The mycelium could be detected in the tissues 4 days after inoculation; 2 days later it may emerge at the periphery, simultaneously with the emergence of conidiophores through the stomata or at the margin of the disk. From the 7th day the disks began to decay and shrivel; by the 9th incipient oospore formation was discernible.

Klarner (S.). **Odporność odmian Tytoniu typu Kentucky na czarną zgorzel korzeniową (Thielaviopsis basicola Ferr.).** [Resistance of Kentucky type Tobacco varieties to black root rot (*T. basicola*).]—*Roczn. Nauk rol.*, Ser. A, **79**, 4, pp. 1063–1075, 1959. [Russ., Engl. summ.]

Of the lines tested at the Central Lab. Tobacco Industry, Poland, against *T. basicola* [cf. **33**, 453; **40**, 248], which reduces leaf quality and quantity in susceptible vars., the most resistant were 118, 119, Kentucky G, 7–5/43 Kentucky 3002 × Szamoszaty, and 1/47 Kentucky 3002 × Szamoszaty × Gold Leaf. The last named gave a low and inferior yield of raw material and the last but one yielded raw material of poorer quality than Kentucky 3002.

Merker (J.). **Der Einfluß der Desinfektion des Bodens auf die mikrobiologischen Eigenschaften sowie auf Entwicklung, Ertrag und chemische Zusammensetzung des Tabaks.** [The influence of soil disinfection on the microbiological properties as well as on the development, yield, and chemical composition of Tobacco.]—*Ber. Inst. Tabakforsch. Dresden*, **7**, 1, pp. 7–39, 3 fig., 8 graphs, 1960. [Russ., Engl. summ. 33 ref.]

In this fully tabulated survey and discussion of experiments on 5 types of soil at the Inst. für Tabakforschung, Dresden, Germany, the effects of steam sterilization (20 min. in an autoclave at 1 kg./sq. cm. pressure) and disinfection with 3% formalin, used against *Thielaviopsis basicola* [**34**, 678; cf. **39**, 625] are detailed. As a result, vaporization is recommended as the most reliable method of disinfection as it gives healthy seedlings and enhances soil fertility [cf. below].

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